Gas Journal

VOL. 283. 107th YEAR. LONDON, AUGUST 17, 1955 Nº 4811. PRICE 1/3

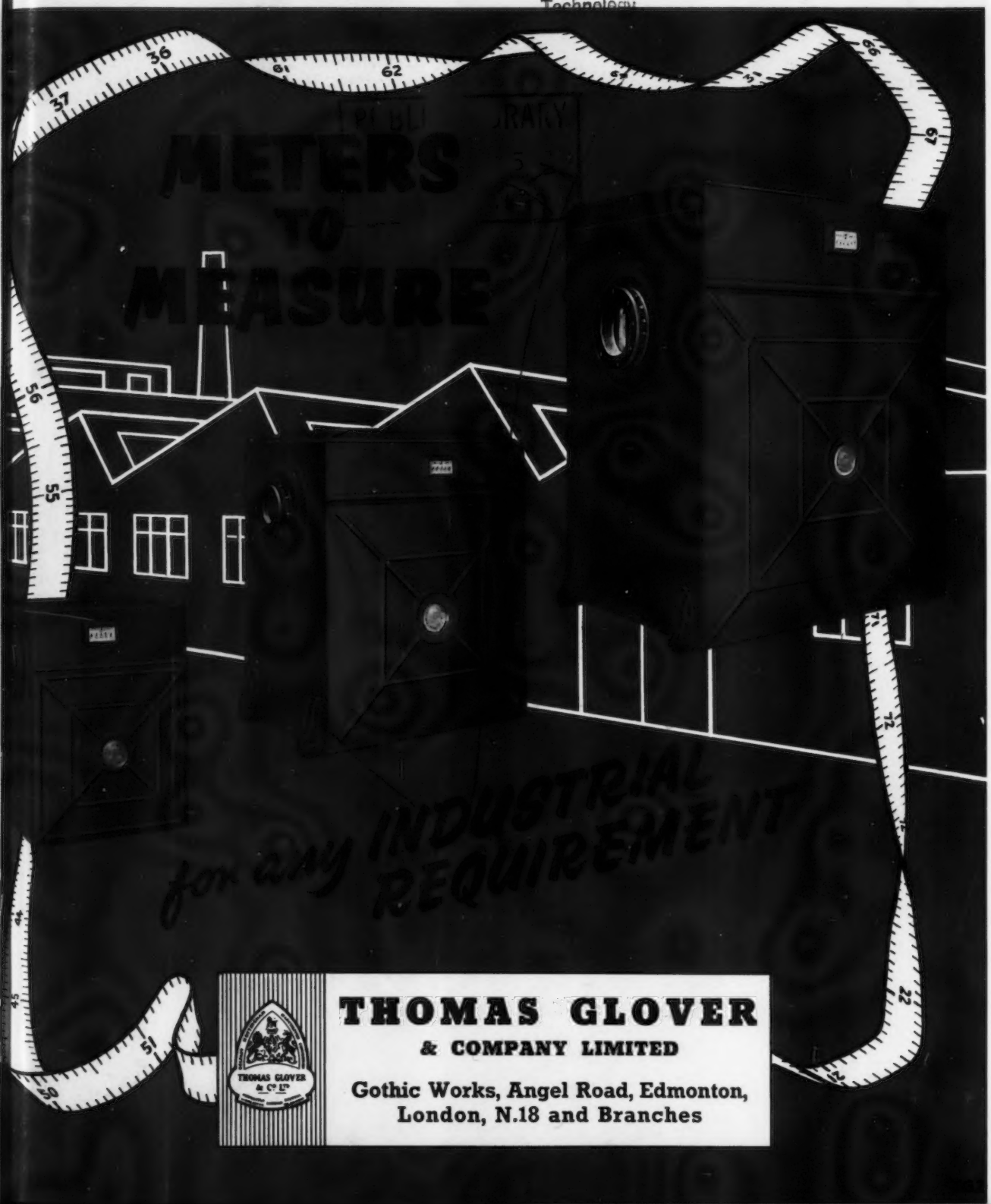

FIG. 150

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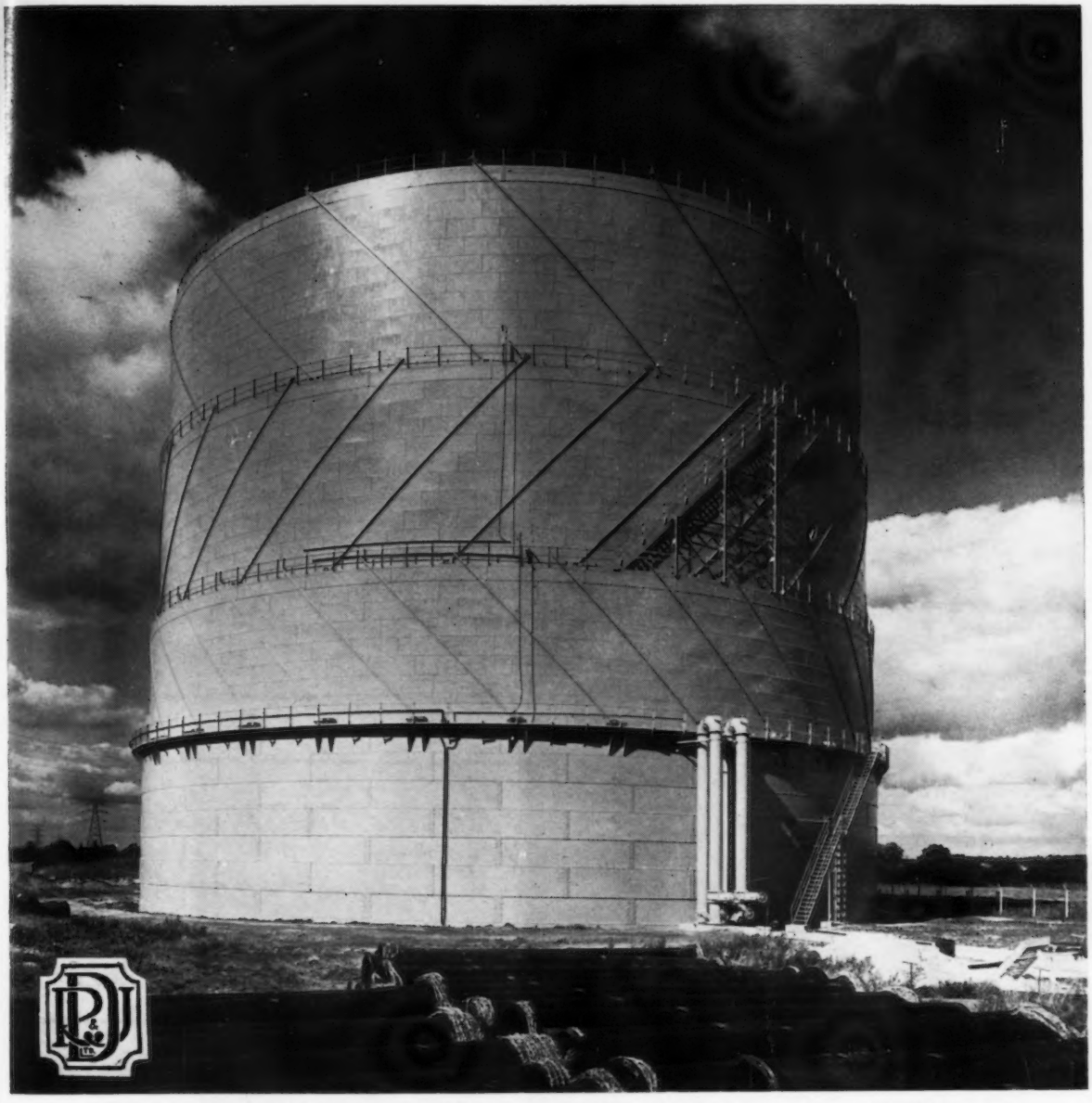

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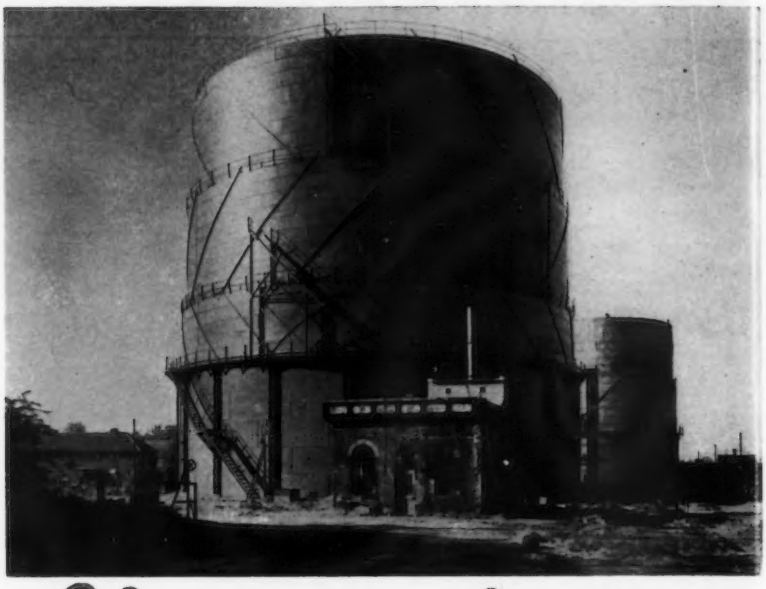

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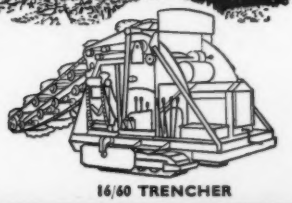

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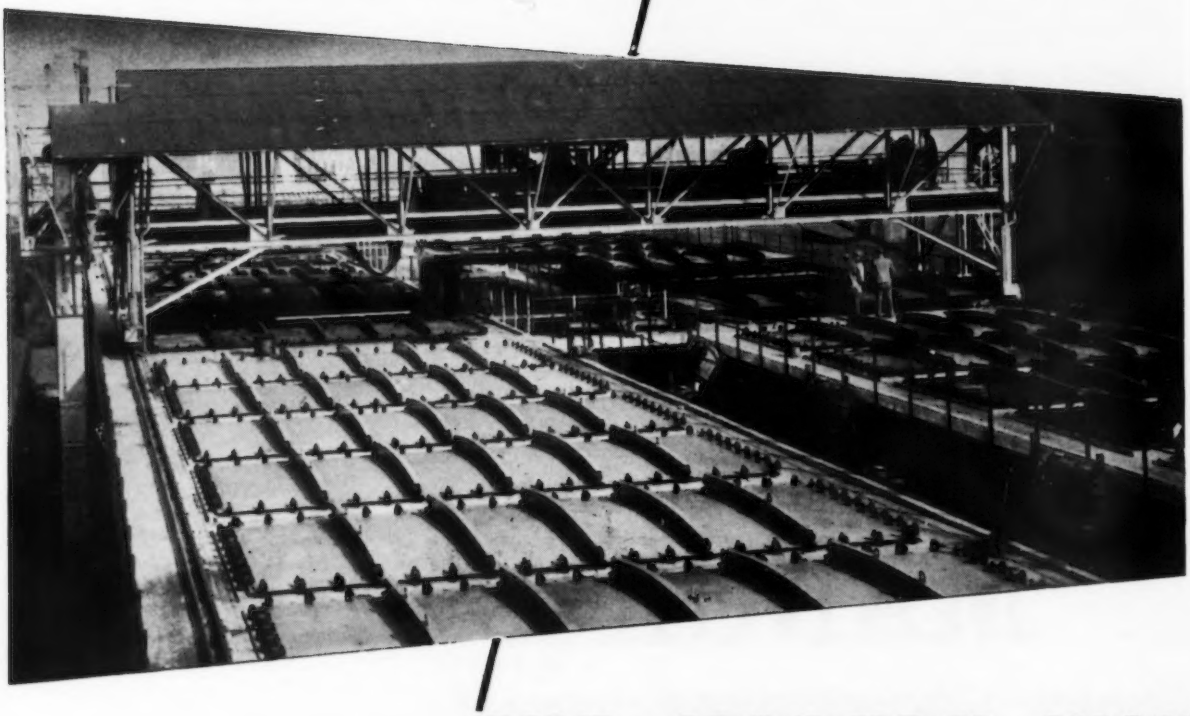

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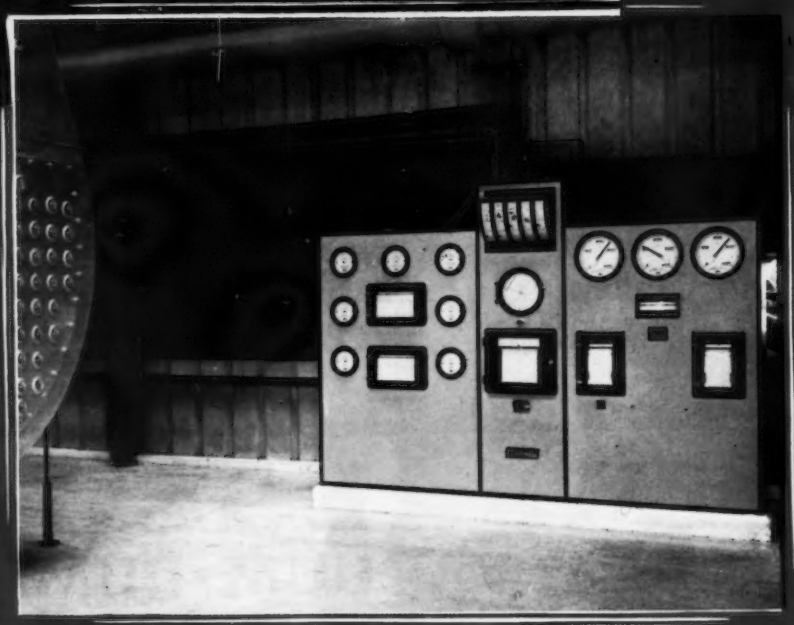

Instrument panel for Waste Heat Boiler and Steam Distribution to Retorts and Producers; one of six panels supplied in the complete instrumentation scheme.

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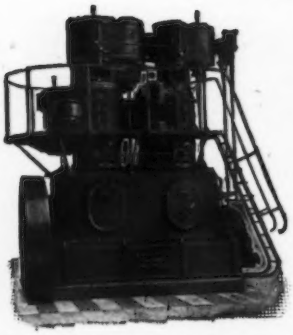

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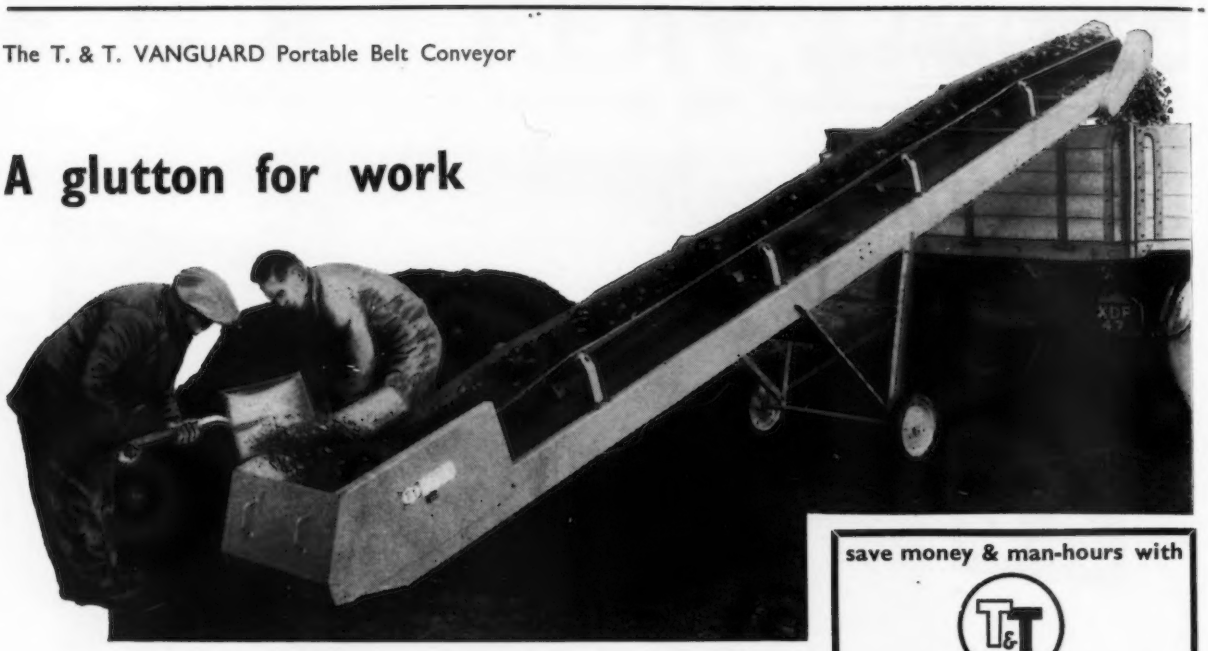

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Lieut.-Colonel M. Lipton (Lab. Lambeth, Brixton) asked the Minister of Fuel and Power what steps are being taken to prevent loss of life caused by defective gas mains.

Mr. Geoffrey Lloyd replied that the gas boards are now spending over £5 mill. a year on the maintenance of gas mains, and they had a day and night service to deal with any escape of gas as soon as it was reported.

Lieut.-Colonel Lipton : 'Is the Minister aware that recently there have been several unfortunate deaths from this cause, and that in one case it was ascertained that the mains had not been thoroughly examined since they were first laid in 1888? What is being done to speed things up in that direction?'

Mr. Lloyd said that very cold weather constituted a special danger in regard to the fracture of gas mains.

Mr. S. Hastings (Lab. Barking): 'Is there any means of ascertaining when corroding of gas mains has taken place so that leakage is imminent?'

Mr. Lloyd: 'I should have to make special enquiries before I answered that technical question.'

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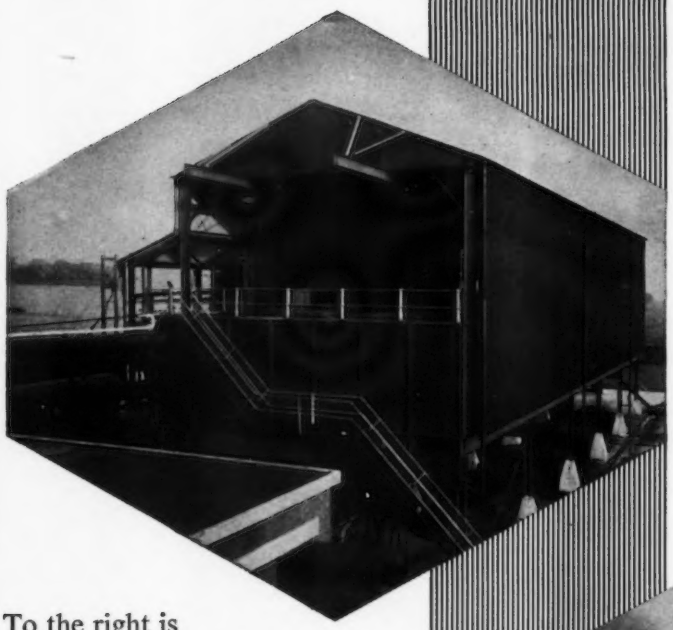

The recently completed installation to the left consists of five welded steel purifier boxes, each 24 ft. by 30 ft. by 10 ft. deep, which were designed, fabricated and erected by Whessoe for the National Coal Board at Stella Gill (Chester-le-Street).

The capacity of this installation is 4 million cubic feet of gas per day.

To the right is illustrated a 6 million cubic feet per day installation designed, fabricated and erected by Whessoe for the North Western Gas Board works at Warrington. It consists of five welded steel boxes, each 45 ft. 9 in. by 35 ft. by 10 ft. deep.

These two installations are examples of the wide range of gas plant made by Whessoe for the gas and coke oven industries.

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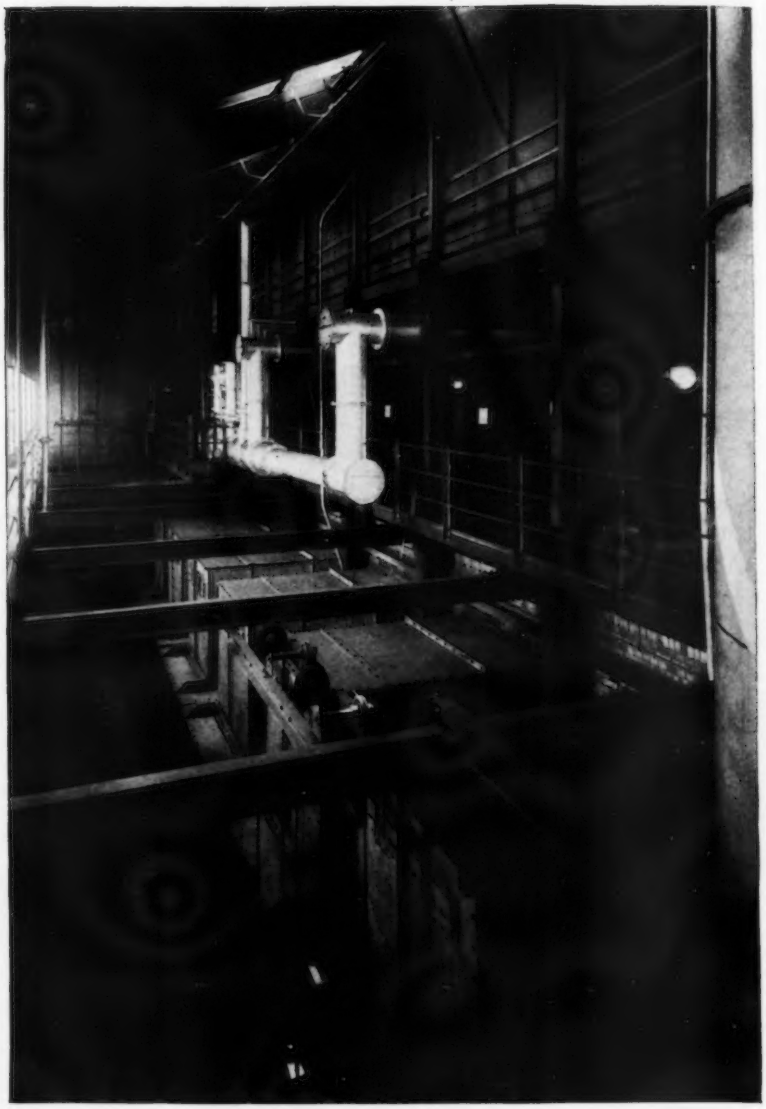
W65

★ Bench showing Waste Gas Offtakes and Main Flue, and Isolation Dampers for Chimney and Waste Heat Boiler.

MANCHESTER
Bradford Road Works

Unretouched photograph published by courtesy of the North Western Gas Board.



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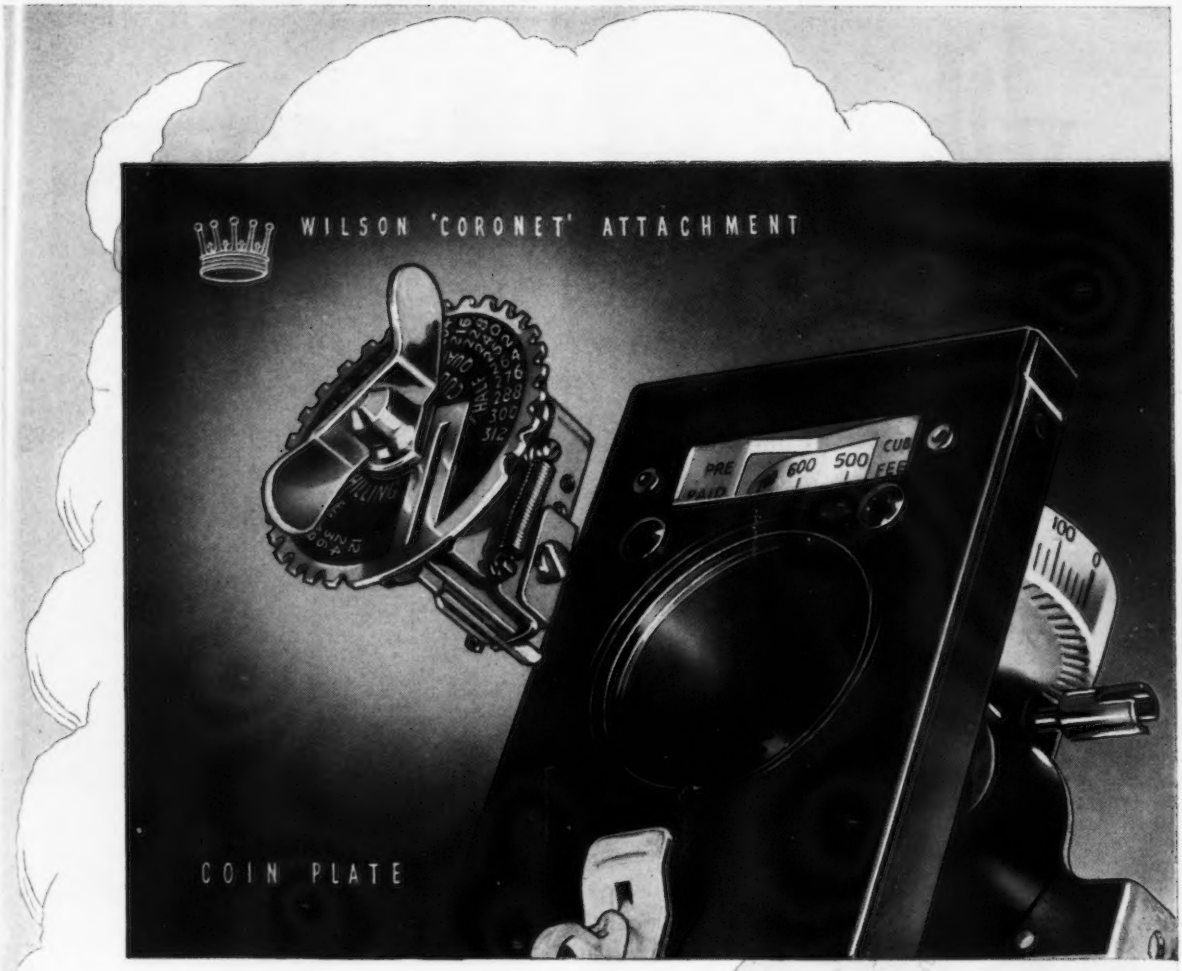
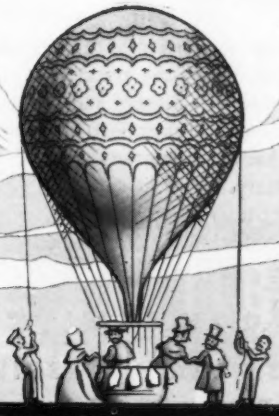


WE ALL DEPEND ON GAS



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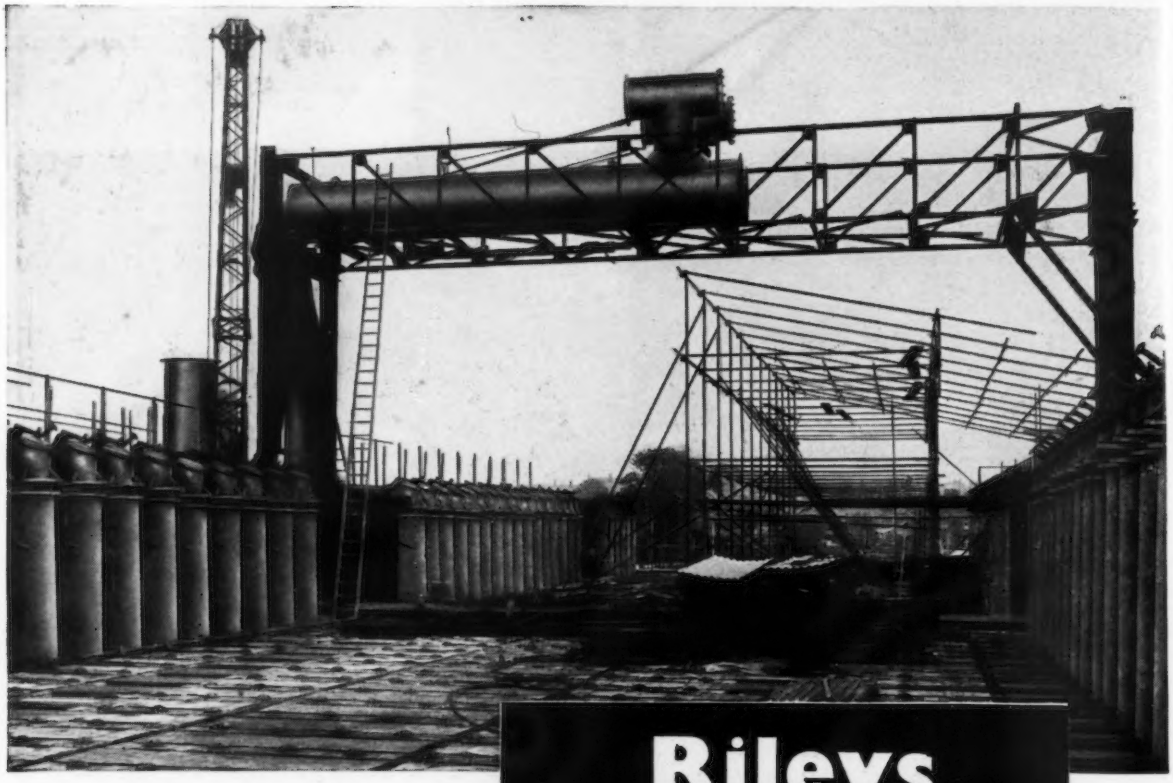

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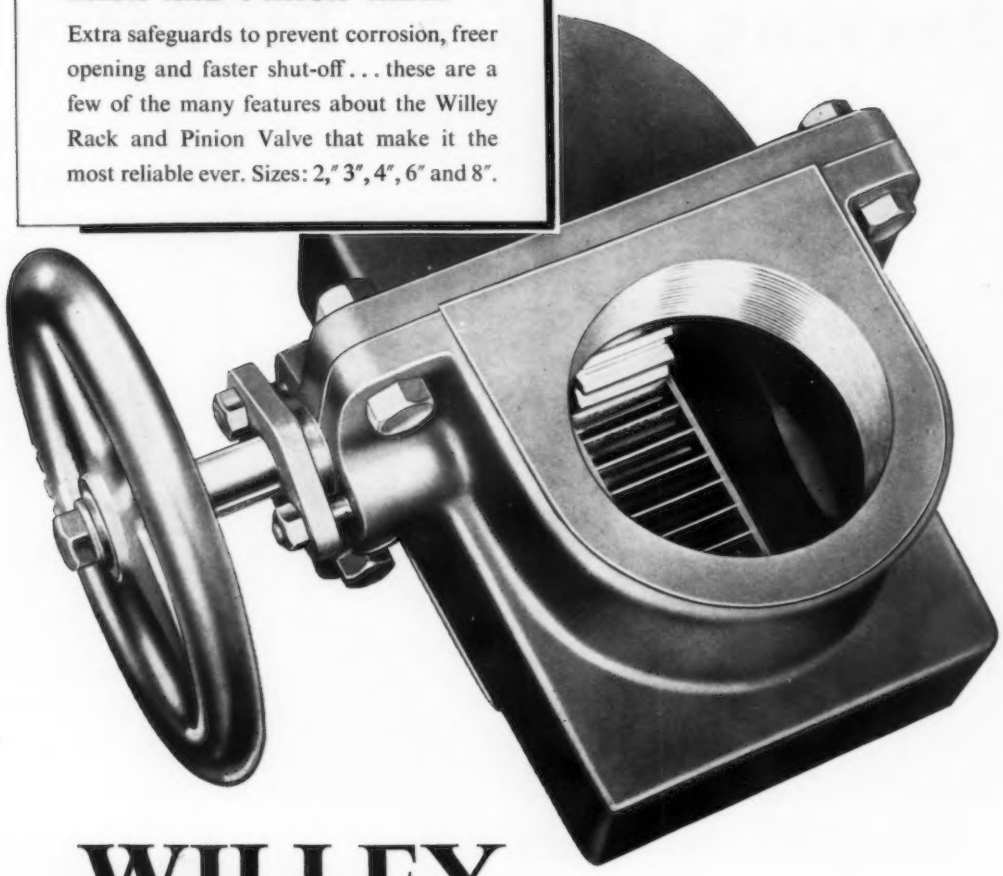

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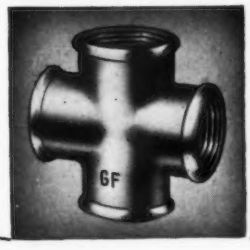

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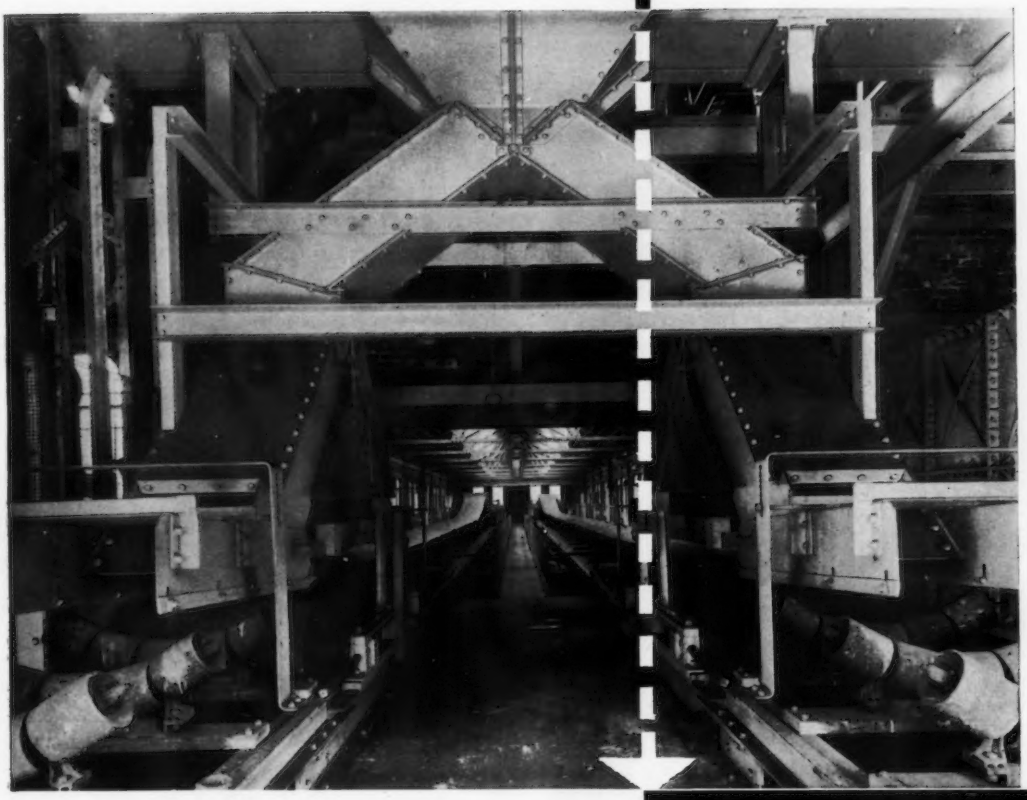

Wigan Overhead Coal Belt Conveyors. Photograph by courtesy of The North Western Gas Board and Drakes Ltd. of Halifax.

Specification — Red Lead Primer, Foochow Grey Undercoat and Foochow Grey Finishing Paint.

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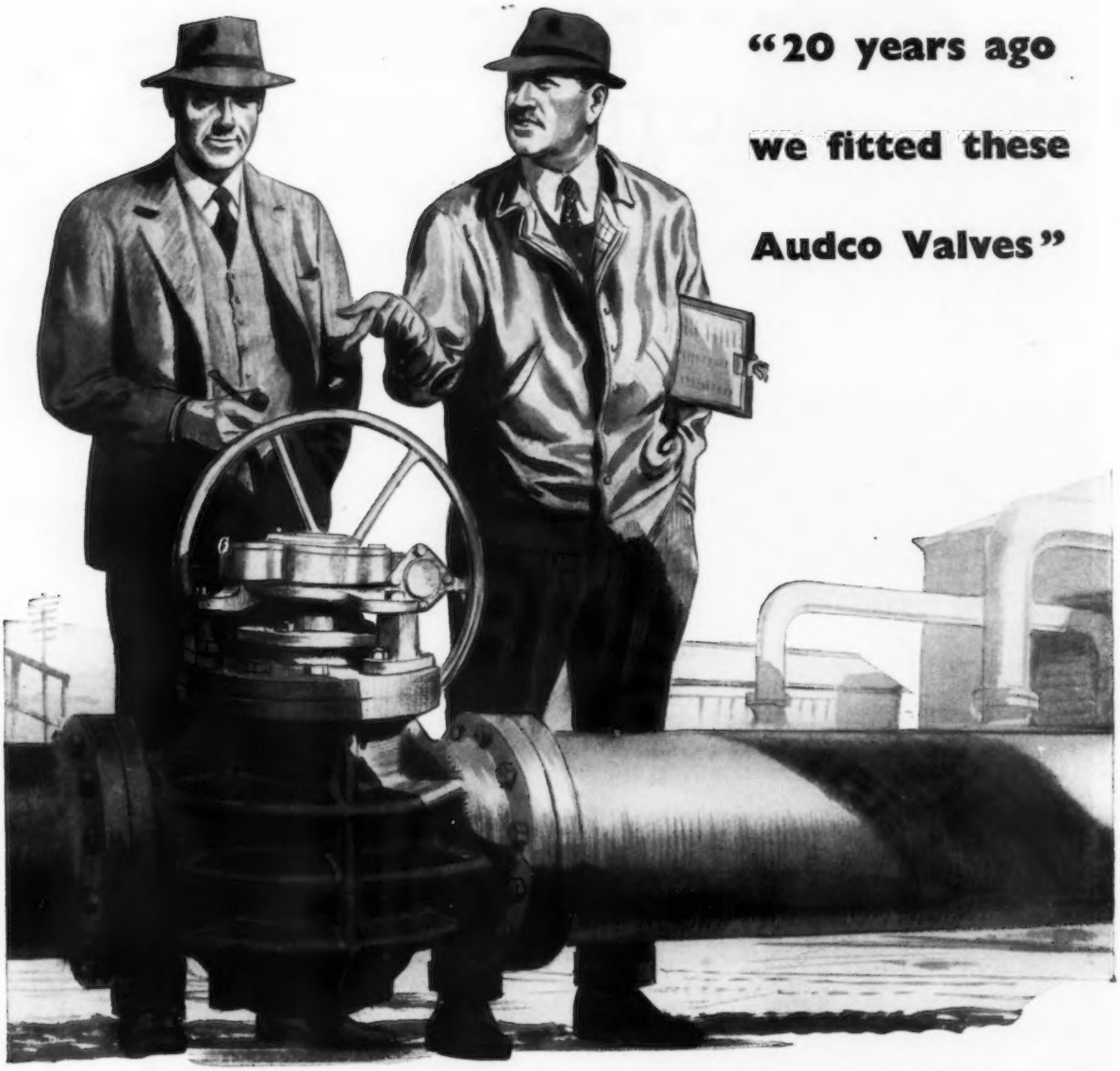

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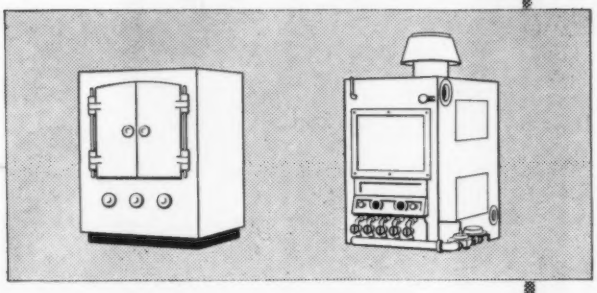

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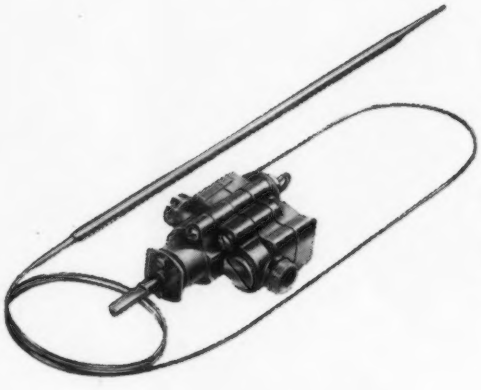

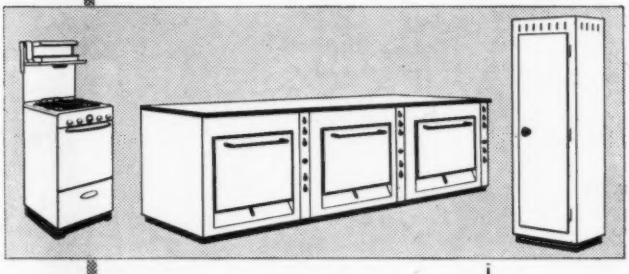

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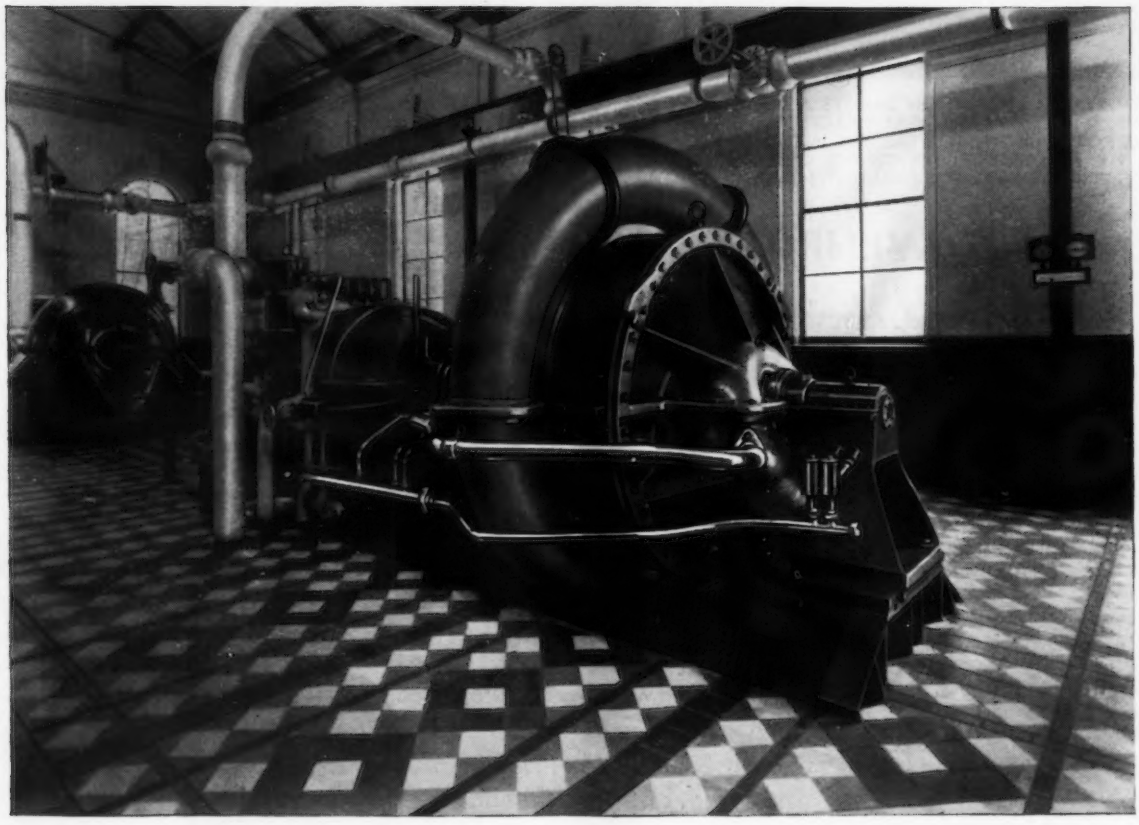

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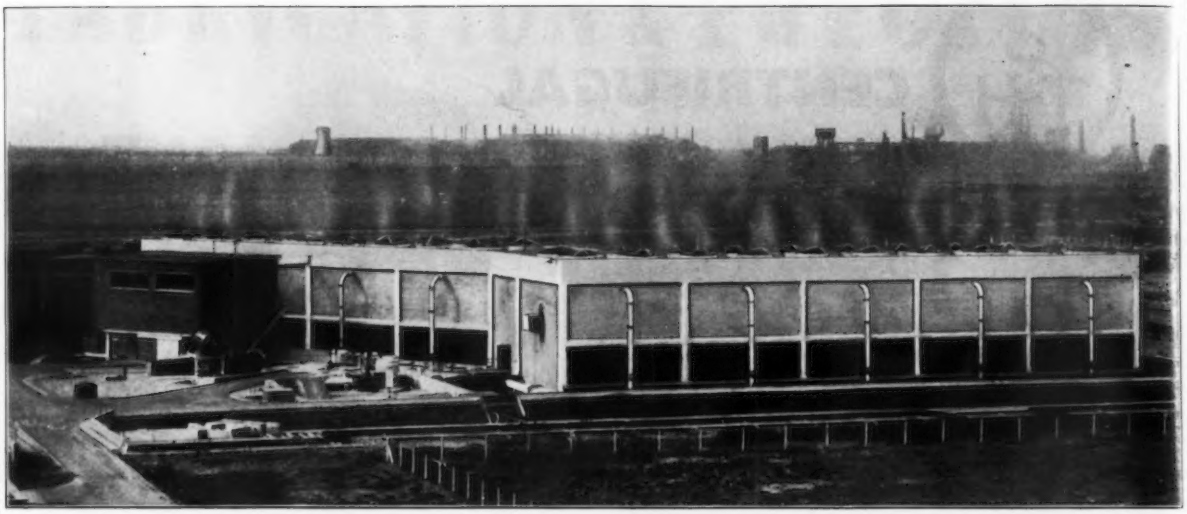

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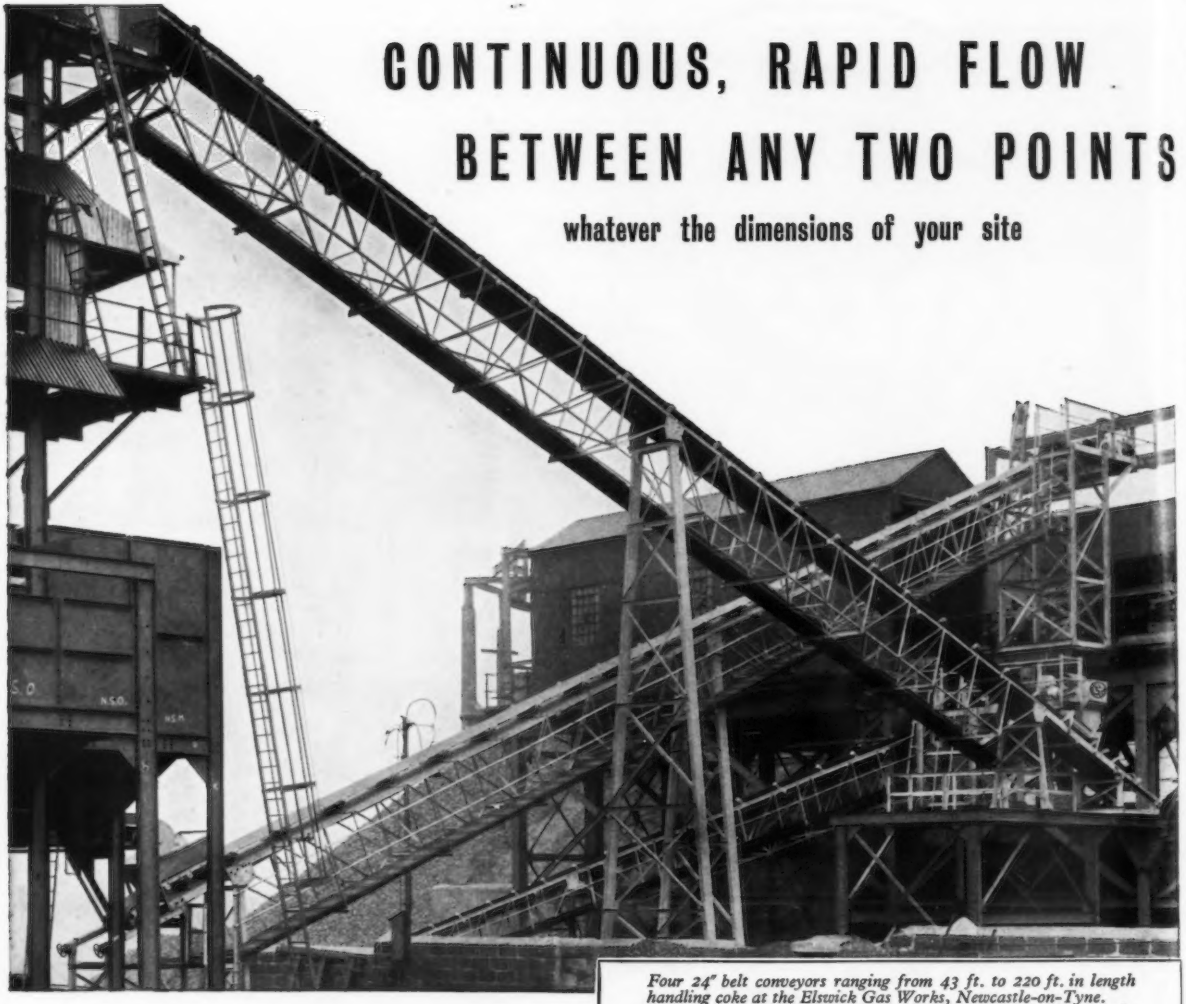

Four 24" belt conveyors ranging from 43 ft. to 220 ft. in length handling coke at the Elswick Gas Works, Newcastle-on-Tyne. (Photograph by courtesy of the Northern Gas Board).

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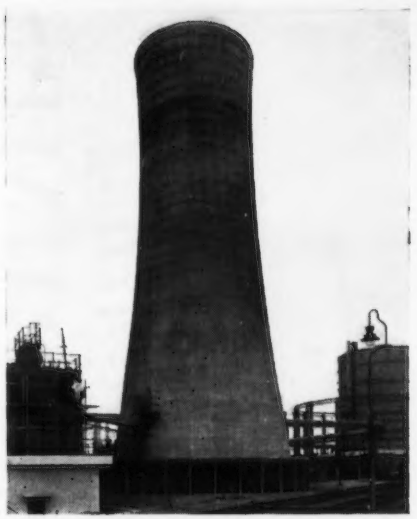

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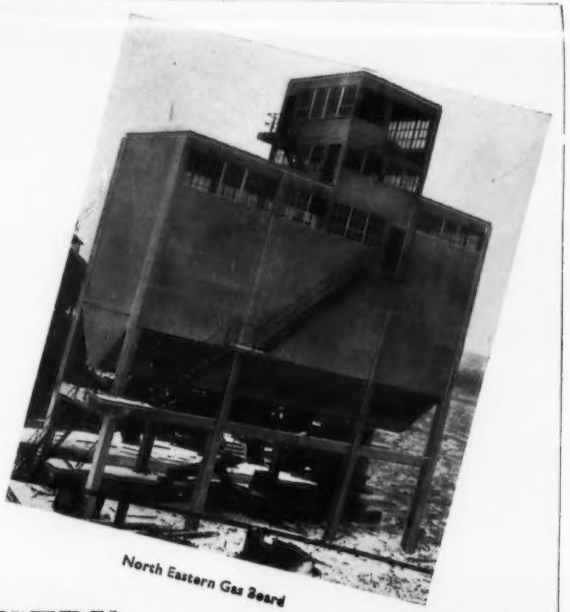

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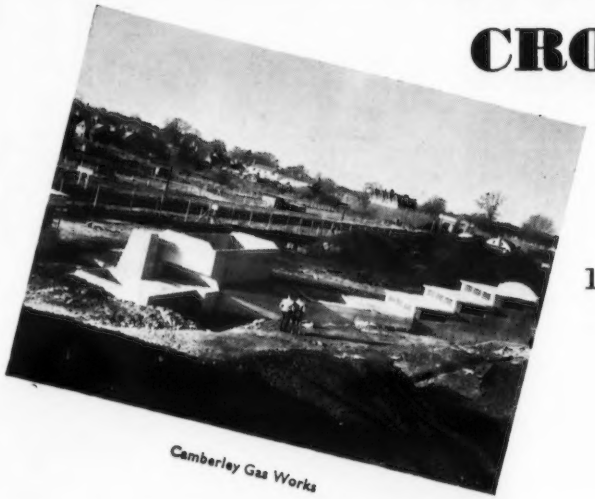

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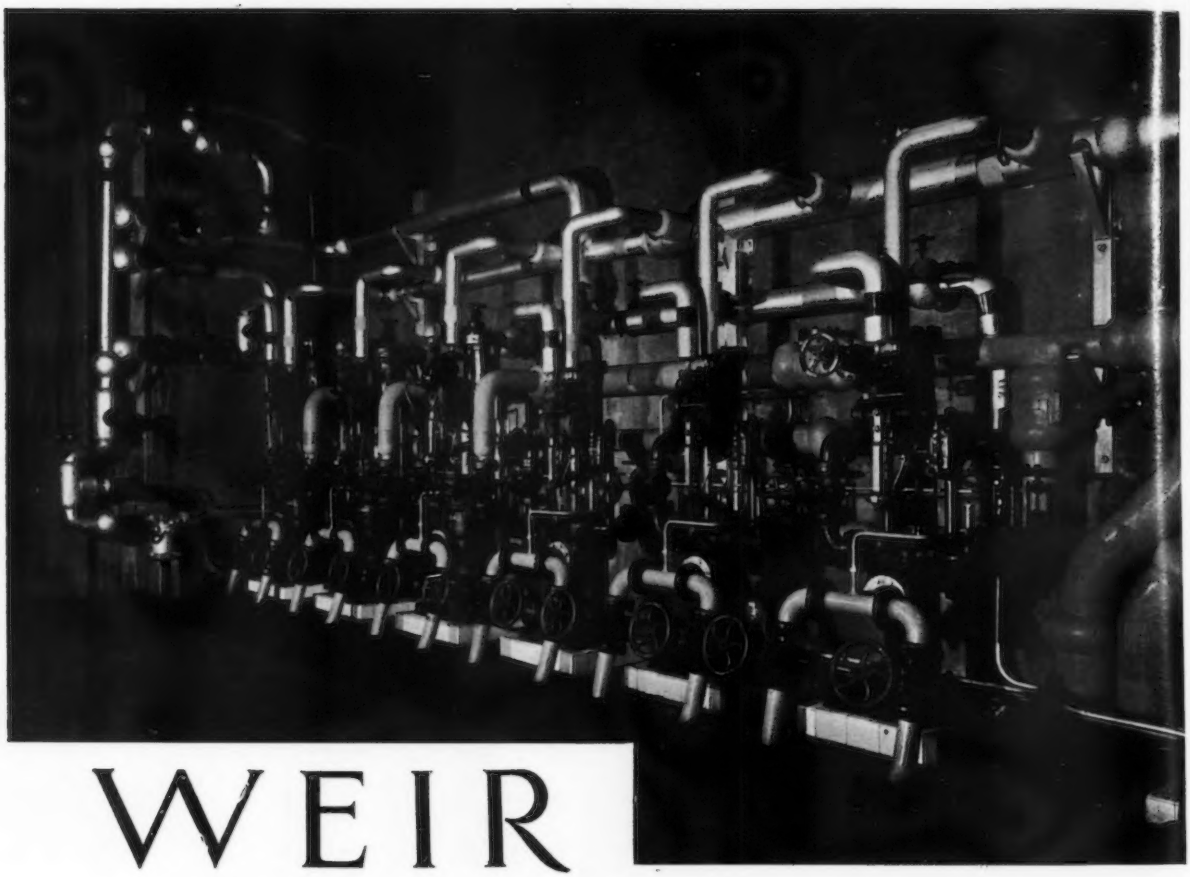

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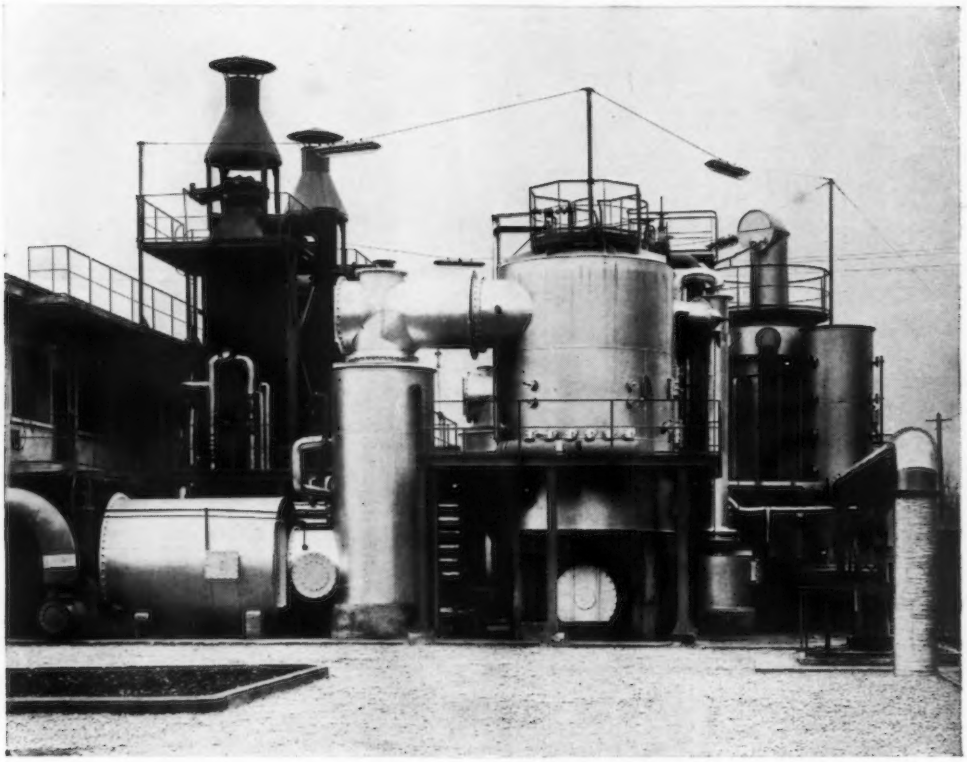

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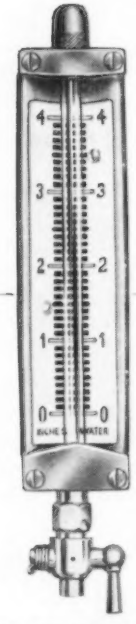

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Gas Journal

VOLUME 283. No. 4811. AUGUST 17, 1955. 107th YEAR

Energy in Europe

IT was at its meeting in January, 1954, we are told, that the Council of the Organization for European Economic Co-operation 'recognized the existence of an energy problem in Europe.' Progress indeed! We can, at least, be thankful that the Council realized that fuller information would be required before it was able to decide what action might usefully be taken within the O.E.E.C. The Secretary-General approached M. Louis Armand, Chairman of the Board of the National French Railways, as one 'highly qualified in these questions,' to prepare a report. That report is now published. While the report aims at presenting a complete survey of the energy resources of member countries the rapporteur has 'concentrated mainly on questions relating to the future.' Recognizing, however, that his report could be neither complete nor very exact, he has confined himself to such aspects of power production and consumption as are of economic interest, looking towards the future, and capable of a favourable solution within the framework of international co-operation.

The Report is based on the proposition that 'to an increasing extent the more complex problems relating to fuel and power are becoming economic rather than technical'—another way of saying that the technical problems are mainly solved. The question now of importance is whether national governments in the first place and finally Western Europe, already to some extent federated in O.E.E.C., are capable of evolving a rational national and international policy—whether they can be brought to take 'a broad synthetic view of general developments throughout the energy sector.' However that may be, to the working gas engineer the principal interest of such a report as this is its revelation of the attitude of the people at or near 'the summit' towards the relative importance of the several forms of fuel and energy. What then is that attitude? Today, we are told, the main competition is between coal and oil. These are seen in terms of power. 'It is a truism that the supply of power is one of the most important factors in a country's economic development.' And with regard to the future, 'less emphasis should be laid on technique and the fear of shortage than on economic considerations'—a startling proposition!

The cost of power is assessed rather in terms of productivity than of money, comparing the price of energy with labour costs. The American worker can buy out of his earnings, two to 16 times more coal (the range is pretty large!) than his European brother, four to 13 times more petrol, and two to nine times more electricity. But the interesting point is that a sharp distinction is drawn between 'productive' and 'non-productive' power (corresponding broadly to industrial and domestic power), the latter 'used for everyday needs to improve all the various forms of comfort (heating, lighting, cooking, travelling, etc.), the former 'to activate the production and distribution circuits on which the increase of a country's wealth depends'—a distinction which is 'absolutely primordial.' The corollary is that productive power helps to raise a country's standard of living; non-productive power serves to measure it. So that two kinds of power policy might be based on the rate charges in the two categories. A policy based on cheap productive power would be a sounder one from the point of view of a genuine increase in the wealth of a community; the other might have a more immediate effect and 'would be a greater vote-catcher.' A really sound policy would preserve a reasonable balance between the two.

Productive energy is also measured in terms of power consumption per head in industry. 'An industrial worker in the United States consumes about 175,000 kWh a year, whereas his European colleague has only an average of 56,000 kWh; the figure for Great Britain is 85,000. On the other hand consumptions of non-productive power must not be used without discretion since climatic conditions vary—in such matters, for example, as space heating. The rapporteur deplores the fact that more attention has been given to the production of power than to its uses. His treatment of this point is very brief, and it is to be feared that he gives the United Kingdom too much credit when he is encouraged by the existence here of a Ministry of Fuel and Power. 'General studies of the use of energy can only be handled by bodies responsible for power policy, in general.'

In a comparison of power transmission and fuel transport, the rapporteur comes to the conclusion that 'transport of oil is now cheaper than for any other form of energy. *As in the case of gas*, transport can be effected practically without loss or, at any rate, with much less loss than in the case of electrical power.' His statements and conclusions on atomic energy, its present position and future prospects, are not very different

from those with which we are familiar. 'All estimates agree that a certain proportion of the increased demand for power will have to be met from traditional resources in the next 10 or 20 years.' Most will agree that this is a very modest estimate. The point is *not* made, either at this point or in the final conclusions of the report, that fossilized fuels are exhaustible in, say, two or three centuries, whereas fissile materials appear to be practically inexhaustible or exhaustible over a period many times as long.

The rapporteur goes on to a brief survey of present and future aspects of certain questions relating to traditional sources of energy. He surveys the sources of crude oil and natural gas. On the question of the transport of natural gas from the Middle East to Europe, he favours the shipping in tankers of liquefied gas rather than the pipe-line, mainly because of the complicated political problems associated with the latter. Manufactured gas is treated somewhat summarily. Its importance is not denied—'the question of coal gas should be considered in conjunction with the problems confronting other sources of energy.' But on the whole the subject can be 'summed up with a metaphor'—'coal gas represents, as it were, a cross-roads in the realm of energy—all its problems are dominated by matters of much more general scope.' There is quite inadequate appreciation of the necessity of coke to the iron and steel industry. Most important among the conclusions is that the Council of O.E.E.C. is recommended to set up a Fuel and Power Economics Committee composed of persons particularly qualified to deal with matters relating to energy. That the gas industry should insist on being adequately represented on such a committee is emphasized by the fact that M. Armand himself, in the preparation of his extremely interesting report, expresses warmest thanks to the Chairmen of the Electricity and the Oil Comittees of O.E.E.C. and the Vice-Chairman of the Coal Committee, for their assistance. He does not appear to have consulted anyone particularly in the gas industry.

World Power Conference

WHILE many fuel problems have been solved in the 31 years since the first World Power Conference was held in London in 1924 an infinitely greater number of new and still unsolved problems have presented themselves. Some old fuel and power resources have diminished; new sources and new processes have been discovered and developed; the atomic age has dawned; and the objects of the World Power Conference as set out in the preamble to the constitution have never been so vital as they are today. The annual report for 1954 recalls that after three plenary Conferences (London, 1924; Berlin, 1930; and Washington, 1936) and five Sectional Meetings there was a lapse of nine years between the Sectional Meeting in Vienna in 1938 and the first post-war Fuel Economy Conference at the Hague in 1947, since when there have been the Fourth World Power Conference in London in 1950 and Sectional Meetings in New Delhi in 1951 and in Rio de Janeiro last year. Arrangements have now been completed for the Fifth World Power Conference to be held in Vienna from June 16 to 23 next year, to be followed by six to 10 days of post-Conference study tours. Elsewhere in this issue we publish the list of 26 papers which are to be prepared under the auspices of the British National Committee. The authors will include Dr. J. Burns, Dr. F. J. Dent, Mr. J. E. Davis, Mr. E. M. Edwards, Professor A. L. Roberts, Dr. W. H. Blackburn, and Dr. A. Parker, and their communications will cover a wide range of studies, especially the preparation and conversion of fuels and the utilization of primary sources of energy.

At the recent annual general meeting of the British National Committee Sir John Hacking was re-elected Vice-Chairman, and Mr. F. G. Brewer, Secretary of the Gas Council, was re-elected Hon. Treasurer of the Committee. It was decided to extend invitations to the National Industrial Fuel Efficiency Services (N.I.F.E.S.) and to the Institution of Heating and Ventilating Engineers to appoint representatives to serve on the Committee. These invitations have since been accepted, and Dr. W. A. Macfarlane, Chief Executive, now represents N.I.F.E.S., while Mr. Walter Harding represents the Institution of Heating and Ventilating Engineers. Sir Walter Drummond, until recently Deputy Chairman of the National Coal Board, has been elected an Individual Member. Subject to ratification at the 1956 annual meeting the executive committee of the British National Committee has invited the United Kingdom Atomic Energy Authority to appoint a representative to serve on the committee, and the Authority has accepted the invitation and nominated Mr. C. E. Iliffe.

Sir Vincent de Ferranti, M.C., who is also Chairman of the British National Committee, presided at a meeting of the International Executive Council in Paris in June, the other representatives of the British National Committee present being Sir John Hacking and Dr. A. Parker, C.B.E., Vice-Chairman and Hon. Secretary respectively. The attendance was the largest at any Council meeting since the one held in London at the time of the Fourth World Power Conference in 1950, 28 member countries being represented by 45 delegates. The timetable for the Fifth World Power Conference was discussed, as was the draft technical programme for a Sectional Meeting to be held in Jugoslavia in June, 1957. Acceptance of an invitation of the Canadian National Committee, supported by the Canadian Government, for a Sectional Meeting in Canada in 1958 was re-affirmed; the meeting will be held at Montreal in September, 1958. Next will come a Sectional Meeting in Switzerland in 1960. Looking still further ahead the Council received and discussed an invitation from the Australian National Committee for the Sixth (Plenary) World Power Conference to be held in Australia in 1962, or alternatively for a Sectional Meeting to be held there in 1961, 1963, or 1964. With notable enthusiasm and unanimity it was decided to hold the Sixth World Power Conference in Australia in 1962. Mexico and the Saar were admitted members of the World Power Conference, and it appears likely that after the completion of formalities Venezuela will be admitted in the near future. Recognition was accorded to the Committee of the World Power Conference set up in Trinidad and Tobago, British West Indies. There are now 46 member countries.

A third impression of the Fifth Edition of 'Technical Data on Fuel' (edited by H. M. Spiers) has been published by the British National Committee at 25s. net. Another new issue from Grand Buildings, Trafalgar

Square, W.C.2, is the Central Office publication, 'National Committee and Representatives' giving up to date lists of officers and members of all the committees.

GAS ON TELEVISION

SIR HAROLD SMITH, Chairman of the Gas Council, and Mr. Leslie P. Ingram, Chief Engineer of the South Western Gas Board—not to mention lesser lights in the gas industry firmament—made successful appearances on television on August 8 in a 'Westward Ho!' feature 'Around the West Country,' introduced by Mr. Cliff Michelmore. Sandwiched between a visit to the Channel Islands for the annual 'Battle of Flowers' in Jersey and some beautiful pictures of young visitors at a riding stable in the Cotswolds was 'Pipeline,' the story of 'a new venture in the supply of domestic gas.' Mr. Ingram gave in simple language an account of gas integration in the area of the South Western Gas Board which led up to the laying by Sir Harold Smith last month of the last length of the first 1,000th mile of main constructed by the Board since vesting day. He showed how the grid would eventually link Evesham in the north of the area with Penzance in the extreme south-west—a distance of something like 260 miles; how the 107 gasworks taken over in 1949 would eventually give place to 16 major manufacturing stations; and how innumerable hamlets were to get gas supplies for the first time as a result of the passing of the mains through hitherto untouched parts of the area. The story was summed up in a series of maps similar to those given by Mr. C. H. Chester, Chairman of the Board, in his Institution paper last year, and shots were given of the actual ceremony at Beacon Hill, near Shepton Mallet, when, with a silver spanner presented to him by Mr. Chester, Sir Harold Smith completed the link in the 12 in. high-pressure main which connects Bath with Chard and will ultimately continue to Exeter, Torquay, and Penzance.

STUDENT SHORTAGE

IN the recent Parliamentary debate on scientific and technical manpower the Financial Secretary to the Treasury, Mr. Henry Brooke, said that he regarded the supply of scientists and technologists as among the most crucial problems of our land. We are at a stage when industry, the Government, and the schools are all competing for a limited and inadequate supply of scientists. Mr. Brooke proposed, as the only possible solution, that our schools aid universities should be able to turn out more and more men and women with a scientific training. In this respect both industry and the Government should recognize that unless enough scientists are enabled to teach in schools, and unless there are sufficient equipment and facilities in the schools for the training of boys and girls as scientists, we shall all, in the end, be defeated.

In the same debate Mr. Austen Albu, M.P. for Edmonton, mentioned the gas industry, in which, he said, there are complicated new technical processes for the production of gas—gas from oil, complete gasification of coal which is being undertaken in Germany, and so on—which are themselves dependent on research and on having enough chemical engineers capable of designing and building the plant. But that is only one field of industry in which the advance towards greater efficiency is creating a need for a growing ratio of technologists to technicians. We would expect that it would not be difficult to persuade sufficient young technicians to follow the necessary higher education to become technologists. Many already do so, but far from enough, although we know that the facilities exist. There are part-time day and evening courses, correspondence courses, and 'sandwich' courses. Yet the Regional Advisory Council for Higher Technological Education in London and the Home Counties reports that this year several colleges have decided not to offer certain courses—such as the City and Guilds of London Institute courses in boiler house practice and steam utilization practice and technology—since they have been so poorly supported by industry and as insufficient students have come forward to enrol. Officials of many other colleges are worried about the paucity of support for technological courses.

The dearth of technologists cannot be blamed on a shortage of college facilities. Where then does the fault lie? Why is so little interest being taken in the courses? We feel that much of the blame can be laid on our secondary school system. In this country there is only one technical secondary school for every five grammar schools, and in great areas of the country there is not one at all. The result is that far too great a proportion of students who proceed to higher education specialize in the arts rather than in the sciences, and the interests of those who do not proceed to higher education are not involved in technical thought at all. What is the use of providing ample further training if there are not sufficient technical secondary schools to provide the students? If our industries want technologists they must not only encourage higher technical education but also the secondary education which paves the way.

PRODUCTIVITY THROUGH EFFICIENCY

AN illustrated digest of the annual report of Imperial Chemical Industries, Ltd., for 1954, produced especially for I.C.I. men and women, states that work study is playing an ever more important rôle in the Company's factories and offices. Last year an additional 3,500 employees came under work-studied incentive schemes, raising the total to 27,750. Abroad, work study techniques are being increasingly applied in several subsidiary and associated companies, and in every case there has been a notable increase in productive efficiency. The 25-year-old works council system has been investigated to see whether it meets present-day needs. Little change is likely to be recommended—a tribute to the sound principles on which it is based. I.C.I. is doing all it can to help overcome the shortage of able young men with technical qualifications; in particular the Company is pressing for bold and effective measures to increase the number of graduate science teachers in schools. To recruit junior and clerical staffs of high standard, the Company maintains contact with schools, training colleges, and similar institutions. For girls who wish to become secretaries, training is now provided in many parts of the Company. Since 1947 practically all the female staff in London have joined I.C.I. from various high schools and county grammar schools, and have been trained in the Company's own head office training school.

An outstanding training development has been the establishment of the Company's residential centre at Warren House, Kingston Hill. This will enable the various staff, commercial, work study, and other courses that have been established since the war to be extended, and it will also provide opportunities for closer contact between the home and overseas I.C.I. staff who attend the courses. These central courses do not lessen the importance of local training activities, and about 2,000 plant managers, foremen, and other supervisors attended courses during 1954. Against this background of the promotion of productivity through efficiency the story of the Company's fortunes last year is one of steady progress in production, sales, and employment. Sales reached £352 mill., which includes £25 mill. of sales made by new subsidiaries in Canada and South America.

Personal Notes

MR. CHARLES MEIKLEJOHN, Deputy Chief Clerk at the Board's branch office at Rugby, is retiring after 41 years' service with the Rugby Gas Company and its successors, the West Midlands Gas Board. Mr. Meiklejohn joined the Rugby undertaking in 1914. His uncle, the late Mr. C. Meiklejohn, and his brother, the late Mr. R. J. Meiklejohn, were former managers of the Rugby Gas Company.

MISS JOAN FARQUHAR has recently joined the staff of the Parkinson Stove Co., Ltd., as Home Service Adviser. Miss Farquhar qualified by taking a course in Institutional Management and Large Scale Catering at Aberdeen School of Domestic Science. From 1951-55 she was Home Service Adviser on the Central Division of the North Thames Gas Board.

MR. J. E. WILKES, District Engineer and Manager at Torquay, has left the South Western Gas Board to take up a position on the contracting side of the industry. His successor at Torquay is MR. O. PINCOCK, formerly Distribution Engineer in the Weston/Taunton Division. A Yorkshireman by birth, Mr. Pincock was educated at Grammar Schools at Harrogate and Weston-super-Mare, and entered the employ of the Weston-super-Mare undertaking in November, 1930, as Junior Technical Assistant. He graduated at Bristol University in June, 1936, with a degree of B.SC. in Mechanical Engineering. Since then he has been engaged on the distribution side of the industry.

MR. NORMAN W. HOWELL, 12, Buckingham Road, Cadishead, Manchester, has been appointed North Western Area representative of Autocontrol Boilers, Ltd.

MR. T. V. GARRUD has been appointed by the North Thames Gas Board to be Controller of Services with effect from September 12. He will continue to be responsible for the Industrial Workshops as well as assuming responsibility for the Building and Property Maintenance, Stove, Meter, and Transport Departments. The Board also announces the following Commercial Staff changes: MR. G. H. W. MADGE to be Assistant Commercial Manager; Mr. P. N. CARPMAEL to be Assistant to the Commercial Manager (with responsibility for service and warehousing); MR. C. PEARSON to be Divisional Manager, Central Division; MR. W. D. ELLIS to be Divisional Manager, South Western Division; and MR. M. A. GRIFFITH-JONES to be Commercial Assistant to the Divisional Manager, Central Division.

Mr. T. V. Garrud.

MR. HARRY J. WHITEHEAD has been appointed Sales Manager of John Ingham & Sons, Ltd., Colliery Engineers, Middlestown, Wakefield. Mr. Whitehead is well known throughout the colliery industry, having been for many years Mining Sales Manager with British Jeffrey-Diamond, Ltd., of Wakefield.

Obituary

MR. WILLIAM C. CHAPMAN, formerly for a number of years Manager and Director of the Boston Gas Light and Coke Company, has died, at the age of 69. He resigned in 1943 for reasons of health, but his death occurred quite suddenly. He was chief technical adviser and works assistant to the Great Yarmouth Gas Company until 1923, when he became Assistant Manager at Boston, and five years later he was appointed Manager. He was a former member of the Boston Borough Council and he was also for a number of years Secretary and Treasurer of the Eastern Counties Gas Engineers' and Managers' Association, of which he was a Past President.

Coleraine Gas Committee has received an intimation that the price of coal to the Council's gas undertaking is to be increased by sums ranging from 11s. 7d. to 14s. 4d. per ton. Based on an average yearly consumption the increases will add approximately £5,200 to the annual coal bill. It is probable, too, that rail and freight charges will be increased. The increase will mean that the cost of gas to the consumers will have to be advanced by about 10d. per 1,000 cu.ft. The Council is to consult with other local authorities with a view to making a joint approach to the Ministry of Commerce regarding a subsidy.

Diary

September 2.—WALES G.C.C.: Town Hall, Llandudno, 11 a.m.

September 6.—SOUTH EASTERN G.C.C.: Caxton Hall, Westminster, 11 a.m.

September 7.—SOUTH WESTERN G.C.C.: 34, Bridge Street, Taunton, 11 a.m.

September 9.—MANCHESTER AND DISTRICT SECTION, I.G.E.: Visit to the works of the Derbyshire Silica Firebrick Co., Ltd., Friden, Hartington, near Buxton.

September 12-14.—GAS COUNCIL: Gas Sales and Service Conference. 'Heads of Ayr' Holiday Camp, Ayr. (For programme see 'JOURNAL,' July 20, p. 209.)

September 13-16. — ASSOCIATION OF PUBLIC LIGHTING ENGINEERS: Annual Conference, Folkestone.

September 19. — WEST MIDLANDS G.C.C.: Committee Room, Gas Offices, Edmund Street, Birmingham 3. 2.30 p.m.

September 19-20.—EASTERN SECTION, I.G.E.: Annual General Meeting, Chairman's Address, W. A. Evetts; 'Some Problems involved in the Manufacture and Distribution of Gas,' B. Wilkinson; Grand Hotel, Sheringham.

September 21.—MANCHESTER JUNIORS: Visit to K.L. Cranes, Ltd., Letchworth.

September 22. — STANTON IRONWORKS CO., LTD.: Mr. Geoffrey Lloyd, Minister of Fuel and Power, opens coke oven extensions.

September 22.—SCOTTISH ASSOCIATION OF GAS MANAGERS: Annual General Meeting, Town Hall, Inverness.

September 24.—EASTERN JUNIORS: Presidential Meeting, Norwich.

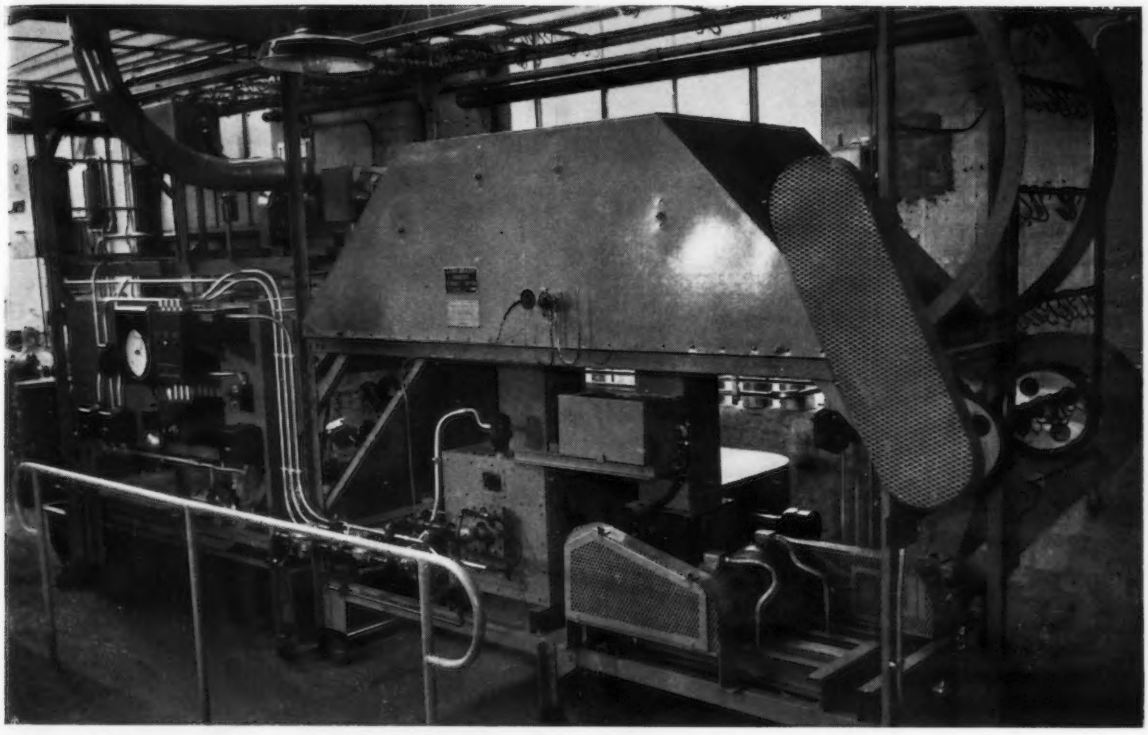
September 28.—IRISH GAS ASSOCIATION: Annual Meeting; Presidential Address, S. L. Doyle (Cork); 'Gas Distribution,' A. L. Allen and J. J. Mahoney; Imperial Hotel, Cork, 10.30 a.m.; afternoon outing to Blarney Castle; annual dinner, Imperial Hotel, 7.30 p.m.

September 29.—NORTH THAMES G.C.C.: Westminster City Hall, 2.30 p.m.

October 4.—SOUTH EASTERN G.C.C.: Caxton Hall, Westminster, S.W.1, 11 a.m.

October 5.—MIDLAND JUNIORS: Report on the Paris visit. Birmingham.

October 19.—SOUTH WESTERN SECTION, I.G.E.: Annual General Meeting. Address by Chairman, W. B. Claridge.



The Ballard-type dipping, draining and stoving plant used for the impregnation of transformers for echo sounders.

Gas Helps the Fisherman Now

'Echo-fishing' vogue means a gas load

A RECORDING echo sounder is, broadly speaking, a device which sends out short pulses of sound from an oscillator in the bottom of a ship, measures the time taken for the resulting echo to return from the sea bed, and presents that measurement in the form of a continuous and permanent record of the depth of water.

In addition to showing the depth of the water beneath the vessel the paper record chart gives a clear indication of the size and position of fish shoals, obstructions, wrecks, and so on.

Development of 'Echo-fishing'

Special echo-sounding equipment is supplied where the location of such objects is of primary importance. So clear indeed are the indications obtained, that skippers of fishing vessels are able to estimate with quite a high degree of accuracy not only the size of a shoal, but frequently the type of fish of which it consists. 'Echo-fishing,' as the new science is called, is now practised throughout the world's major fishing areas.

The fishing industry in this country employs various types of boats which use different methods to catch a variety of fish. They all use the echo sounder, but in different ways.

The big trawlers which fish for cod in the deep Arctic waters locate the huge fish shoals with their sounders, but it is most important that they determine the exact depth and nature of the sea bed. A rocky, uneven bottom would seriously damage the nets and trawling gear and the present-day heavy cost of replacement would soon eat into the profits. The trawler man also uses his sounder in conjunction with his other navigational aids for making port in foggy weather.

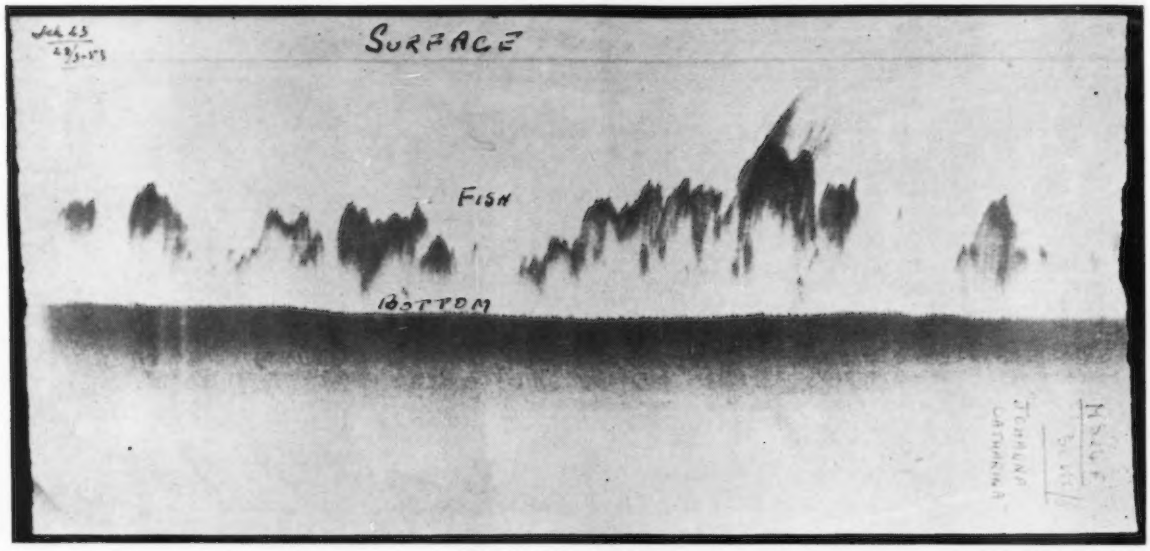
With the echo sounder it is also possible to fish on grounds which could not otherwise be fished safely. Cod, whiting, haddock and other white fish have a habit of lying close up to ledges and banks. Towing the nets blindly over these places would almost certainly result in the gear becoming fast. Using the echo sounder, however, it is possible in many cases to either tow across the ledge or bank, or alternatively tow right up to the ledge and then cant away before the gear fouls the obstruction.

In the herring fisheries the use of the echo sounder has altered entirely the methods used. The practice of shooting 150 nets at a time, 'lying to,' then finally hauling the nets to find them empty has disappeared. Nowadays, the fisherman waits until herrings are definitely located on the echo sounder chart, then shoots the nets with the knowledge that when they are hauled there will be a catch in them.

Other Uses for Echo Sounders

There are many other uses for echo sounders in fishery research, whale finding, oceanography, hydrography, salvage and wreck location, to mention only a few. Many different models, designed specifically for the job they will be required to do, are produced by Kelvin & Hughes, Ltd., who hold a leading position in the production of this essential equipment for the fishing fleets of the world. Gas plays an important part in the development of this scientific instrument, for such as stoving, infra red and box ovens, heat treatment in the hardening shops, plating, impregnation of transformers, brazing and soldering.

We have illustrated the Ballard-type dipping, draining and stoving plant used for the impregnation of transformers. The dipping tank is sub-divided so that two coats of varnish are used. The transformers are placed on the carrier bar on the one half, after which they pass through one side of the dipping tank for the first coat, automatically dipped, afterwards drained

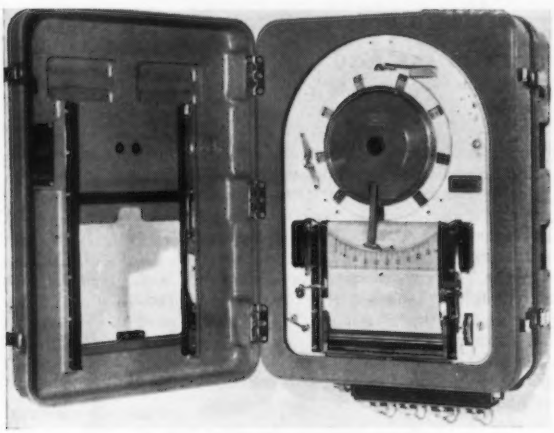


A chart from the echo sounder showing the location of shoals of fish.

and stoved, and returned on the conveyor. The transformers are then placed over the second half of the dipping tank, after which they are automatically dipped for the second coat, drained and stoved.

Heater

The independent gas-fired heater, designed and constructed by the North Thames Gas Board, is constructed so that the products of combustion are mixed with the air in circulation. Design embodies steel plate casing on structural steel frame lined with finest quality refractories, and with insulation



The echo sounder in an open position.

between the refractories and the steel plate casing. The heater is equipped with ducts for connection to fan and to the oven casing, and is designed for temperatures up to 450°F.

Fresh air inlet with mesh guard is damper controlled, and is embodied in branch piece in hot air return duct from the oven casing.

The burner equipment is of aerated type with individual control. A constant pressure governor is fitted on the burner supply. Thermostatic control is by means of indirect relay type, and temperatures are automatically recorded on a thermograph. Air circulation is by centrifugal fan, special heavy construction for dealing with hot gases, and fitted with ball bearings, driven through vee rope drive by motor wound for standard A.C. supply. All the necessary ducting coupling up the heater, fan and oven is in single sheet. Ducting out-

A gas-fired infra red plant composed of 24 panels with temperature indicating equipment.

side the oven is insulated in a similar way to the oven casing. Of similar construction to the circulating fan, the exhaust fan extracts spent gases and drying products, and discharges them to the atmosphere. A magnetic valve cuts off the gas supply in the event of either fan failing.

Combustion Safeguard Equipment

The combustion safeguard equipment is of the flame electrode type with air flow switch, two diaphragm control valves, complete with solenoid valves and push button. Spark ignition is provided.

An automatic cyclic arrangement ensures correct starting procedure and an air flow switch and time delay relay indicates that the oven and the heater have been purged of any unburned gases. When the cycle is completed, the ignition device begins to spark, the solenoid pilot valves are opened, and the gas from the pilot is ignited by the spark. The circuit is completed when the pilot flame makes contact with the electrode and the main valve is then opened, allowing gas to pass to the main burner which is ignited by the already established pilot flame. After a short period the spark ignition is automatically turned off. In the event of flame failure the whole apparatus is automatically closed down.

The approximate overall dimensions of the plant are: Height 9 ft. 1 in., width 3 ft., length 20 ft. Process times: Stoving

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Internal construction of orthodox type but with many improvements both in mechanical design and as to the use of materials, *the whole housed in rugged deepdrawn steel pressings.*

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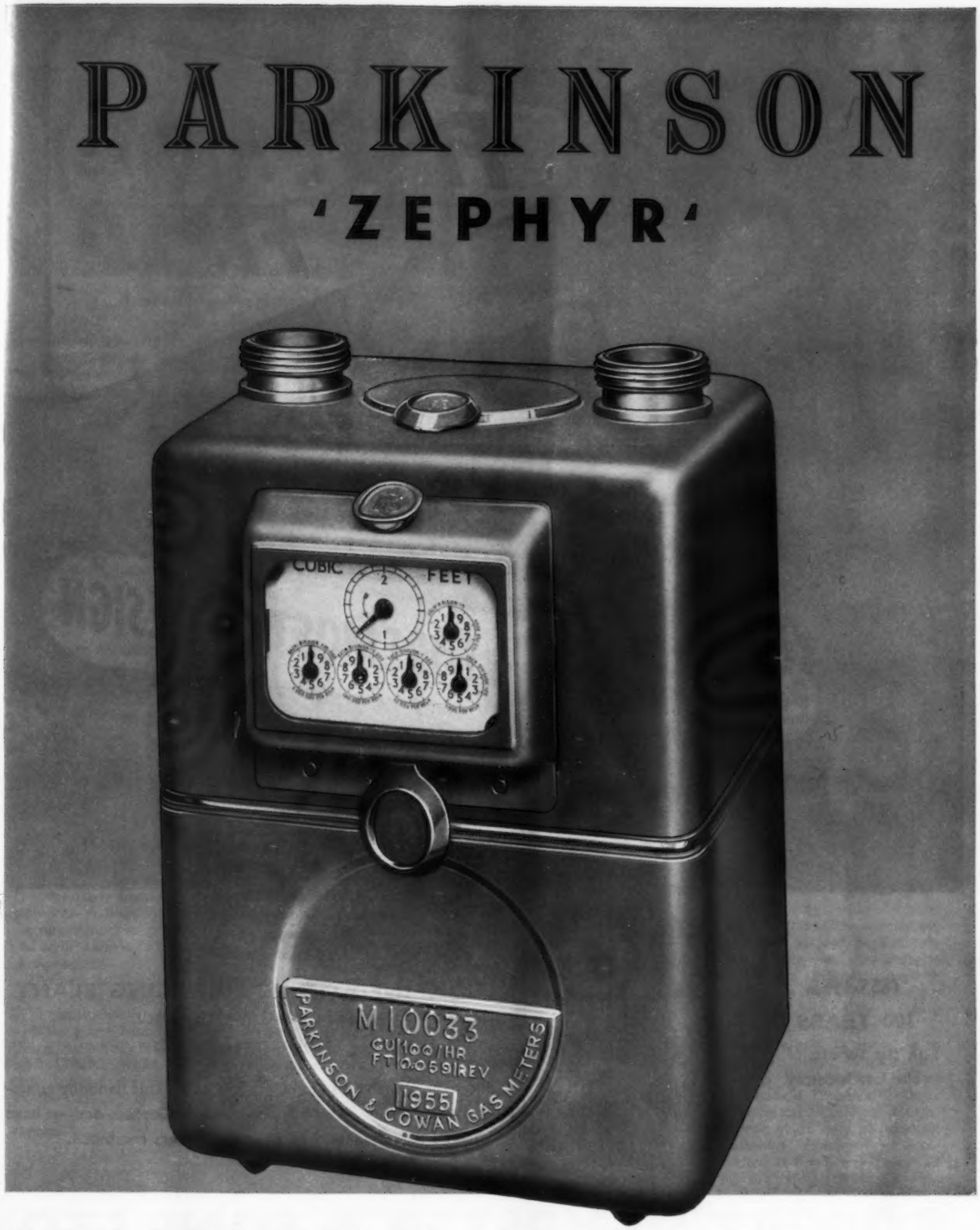

COWAN GAS METERS

GM6

1855-1955
100 YEARS
in the service of
The Gas Industry

COMBINED OXIDE HANDLING PLANT
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for Overhead Purifiers

Introduced into this country by us, the oxide handling equipment illustrated above has been widely adopted, and we have erected more plants than all other makers combined.

ROBERT DEMPSTER & SONS LTD
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A view inside the plating shop.

30 minutes, draining 20 minutes, and immersion 30 minutes.

Output rates are 300 transformers per week of 45 hours, maximum size 7 in. cube. Each transformer is given two coats, the articles being hung singly in the width of the conveyor bar by hooks.

Gas Rate

The maximum gas rate is 500 cu.ft. per hour, maintenance rate for 350°F.—180 cu.ft. per hour. One of our pictures shows a gas-fired infra red plant composed of 24 panels with temperature indicating equipment. Panel temperature is 572°F. The gas rate is approximately 450 cu.ft. per hour. About 100 articles pass through the plant every working hour. These comprise radar transmitting cases, Scamo reflectors, radar console, echo gear equipment, photographic projectors. There are also several box ovens in this department stoving lacquer finishes.

The Plating Shop

So many different articles pass through the plating shop that it is impossible to take a complete record. However, it is interesting to note that the gas-fired plant comprises: One tinning vat, one silver vat, one copper vat, one cadium vat, one nickel vat, one chromium vat, six washing tanks and two anodizing tanks.

B.I.M.C.A.M. BUYERS' GUIDE

Automation is in the news these days, and the products of the industrial measuring and control apparatus industry, which makes much of the equipment that will be in evidence when the 'automatic factory' is a reality, are in growing demand. The British Industrial Measuring & Control Apparatus Manufacturers' Association (B.I.M.C.A.M.) has accordingly taken the opportunity of publishing a *Buyers' Guide* to give engineers and industrialists information on where to obtain specific items of equipment.

The new publication is intended to supplement factually the B.I.M.C.A.M. *Handbook*, which received much publicity in 1953, until another handbook can be prepared. Single copies will be given free to genuine enquirers; for large orders a charge will be made at the rate of 7s. per 10 copies. B.I.M.C.A.M., which now has 35 members, represents important firms in the industrial instrument and control industry. In the last 12 months its members have sold instruments and equipment to the value of £16 mill., including £5 mill. of exports.

Northampton Polytechnic.—Details of the 1955-56 courses in pure and applied chemistry at the Northampton Polytechnic are available at St. John Street, London, E.C.1. The courses are organized on both a part-time day and an evening class basis. Subjects include fuel technology, chemical plant operation, and boiler house practice in preparation for the examinations conducted by the City and Guilds of London Institute. An advanced course will be given in heat transfer with special reference to fuel technology.

THE VITAL THIRD PARTY

A warning that British engineering products were in danger of being driven out of European and other world markets by increasing costs if firms were forced to raise their prices, was made on July 15 in Bristol by Sir A. William Grant, C.B.E., Chairman of the Engineering and Allied Employers' West of England Association. He said the recent staggering rise in the price of coal was bound to add enormously to the costs of production. Should they go up still further through another increase in wages there was no doubt that some firms will have to withdraw from world markets. Those firms which managed to absorb, or partly to absorb, the last wage increase, had now reached their limit. To meet foreign competition British firms were having to spend many thousands of pounds on increased advertising and selling aids. Recent labour troubles on the railways and in the docks had tended to make customers look to countries which could provide more reliable deliveries. Credit arrangements, particularly in the case of Germany, put our manufacturers at a considerable disadvantage.

Raw materials still continued to go up in price because of the increased cost of producing them. It was sometimes forgotten that there was a third party to any wage negotiation. Although he was not present at the negotiations, his word was final. He was the customer. If customers overseas decided not to buy our goods because they were too dear, then employers together with the trade unions could decide what they liked but it would avail them nothing.

TRAINING FACILITIES FOR CHEMICAL ENGINEERS

Developments in training facilities for chemical engineers are reviewed by Mr. J. A. Oriel, President of the Institution of Chemical Engineers, in a letter to members, in which he says: 'A good deal has been done to provide part-time classes, and what matters now is the use which will be made of them. The quality of the few young men who have already been successful in the examinations for the H.N.C. in chemical engineering is high, and they can be expected to be a credit to the profession. Some firms are sufficiently interested in the potentialities of the part-time schemes to allow two-day release instead of the usual one-day release. The Council is preparing suggestions as to suitable experience in employment for chemical engineering apprentices, and it is hoped to send these to corporate members in due course.

A new first degree course in chemical engineering is being started under Professor J. M. Coulson, at the University of Durham, where an M.SC. course is already provided, while the new Department of Chemical Engineering at University College, Swansea, under Professor E. S. Sellars, is to provide a first degree course.

A new three-year sandwich course in chemical engineering is to start at the Royal Technical College, Salford, next month. This will provide tuition for students in whose area there is no suitable chemical engineering course, in addition to providing classes to an advanced level for young men resident in the vicinity of the College. A course of a similar type is being planned at the College of Technology, Birmingham.

Higher National Certificate courses are now in operation in England and Wales at Acton Technical College, London (first two years only at present); Battersea Polytechnic, London; Birkenhead Technical College; Huddersfield Technical College, Hull Technical College, Neath Technical College; Northampton Polytechnic, London (first two years only at present); and West Ham College of Technology, London. In Scotland, similar courses have been started at the Royal Technical College, Glasgow, and also at the Heriot-Watt College, Edinburgh.

There are good prospects of courses for the H.N.C. in chemical engineering being started at the Lindsey Technical College, Scunthorpe, and at the College of Commerce and Technology, Sheffield, in September of this year. At a meeting at Fawley, in March, organised by the Southern Regional Council for Further Education, it was recommended that chemical engineering evening classes be arranged at Southampton Technical College.

FUNDAMENTAL DATA IN GASWORKS PLANT DESIGN*

By Ralph Pollard, Assoc.M.Inst.Gas E.†

THE use of fundamental data and difficulties of their application are outlined in the paper and, in a few instances, suggestions are put forward to account for the apparent anomalies when comparing design calculations with practical tests. One section deals with the development of work in connection with the obtaining of data to assist in the full scale design of liquid/liquid extraction plants and a further section is devoted to consideration of previously published work on gas cooling.

Ammonia Washers

The formal basis for the design of ammonia washers has been published by Hollings and Silver, and by Silver. The method is based on the two1film theory and straightforward formulæ are available for the estimation of the size of the bay and the number of bays required for a given duty. These formulæ are:—

$$\text{For the size of the bay } \frac{KgA}{V} = \frac{kq^1}{kq^1-1} \log_e \frac{kq^1-E}{kq^1(1-E)} \quad . . \quad (1)$$

$$\text{For the number of bays, } S = \frac{qk-1}{qk\left(\frac{E}{qk}+1-E\right)^{-n}-1} \quad . . \quad (2)$$

$$\text{or, } n\log\left(\frac{E}{qk}+1-E\right) = \log \frac{qk\,S}{qk+1+S} \quad . . \quad (3)$$

where: Kg = the Mass Transfer Coefficient (overall).
A = the area of the interface in the bay.
V = the volume of gas washed.
k = the partition factor, defined as the ratio of the amount of solute (ammonia) in the solvent per unit volume to that of solute in the gas per unit volume.
q = the flow ratio that is, the volume of washing liquid used per unit volume of gas.
E = the bay efficiency, defined as the ratio of the amount of ammonia removed to that which would have been removed had equilibrium conditions been fully established.
S = the proportion of the ammonia that is not absorbed.
q^1 = the volume of liquid circulated around the bay during the passage of unit volume of gas.
n = the number of bays or stages.

Both equations should be evaluated using self-consistent units and equation (1) applies to counter-current flow of irrigant and gas. The high rate of circulation within the bay of a modern static washer tends to produce a condition approximating to counter-current flow and the use of equation (1) is thereby justified.

The use of the foregoing formulæ is simple and straightforward, providing that certain basic data are available and soundly applied. These basic fundamentals are discussed below and their true value in plant design will be evident.

Mass Transfer Coefficient.

The overall transfer coefficient Kg may be calculated from the equation,

$$\frac{1}{Kg} = \frac{1}{kg} + \frac{1}{k.kl} \quad . . . . . (4)$$

where kg = mass transfer coefficient of the gas film.
kl = mass transfer coefficient of the liquid film.

$$\text{and, } kg = 0{,}72(D/d)\,(du/D)^{\cdot 44} \quad . . . . . (5)$$

where, D = diffusivity in feet² per hour.
d = equivalent diameter in feet.
u = gas velocity calculated on the free space.

Equations 4 and 5 should not be used without reference to the literature where a proper consideration of the statements is to be found. For ammonia washing, the liquid film may be ignored due to the extreme solubility of ammonia. Values for D for ammonia in coal gas may be calculated from atomic volume data.

Mass transfer coefficients obtained in this manner may be compared with actual washing plant tests and the practical values obtained will include an implicit value for the wetting factor. For design purposes the term A in equation (1) would then be the *wetted* interface; alternatively a volumetric term representing the mass transfer per unit volume may be used.

Partition Factor.

In order to estimate the partition factor it is necessary to have recourse to data giving the equilibrium vapour pressures of ammonia above solutions containing a number of different ammonium compounds (both fixed and free) for a variety of mixtures and at any temperature.

Hollings prepared some results of value to the gas industry but the data are only applicable to coal gas containing 3.5% carbon dioxide and the liquors had not quite obtained equilibrium with regard to carbon dioxide. The results may, however, approximate more to those obtained in practice for reasons which will be seen later.

Challis, of the Australian Gas Light Company of Sydney, made a study of the complex mixtures some years ago, taking due account of the many variables, and produced a valuable equation for obtaining the equilibrium values from a knowledge of the carbon dioxide in the gas, the temperature, the ammonia strength of the liquor and the pressure. The equation may be stated thus:

$$Ge = \frac{0{\cdot}001158}{408+P} C^{1\cdot 15}\, T^{4}\, CO_2^{-\cdot 75} \quad . . . . . (6)$$

where, Ge = ammonia in grains per 100 cu. ft. at S.T.P.
P = pressure in inches, water gauge.
C = concentration of ammonia, grams per 100 c.c.
T = temperature, °F.
CO_2 = percentage carbon dioxide in the gas.

To obtain his data, Challis bubbled crude coal gas through water under steady conditions of temperature and pressure until a state of equilibrium was reached between the vapour pressure of ammonia in the resultant liquor and its partial pressure in the crude gas.

In 1938, Pexton and Badger published an extremely valuable paper in which it was shown that equilibrium vapour pressures could be obtained from the CO_2/NH_3 ratio in the liquor. The results give particulars of the pressures for various concentrations and ratios at 20°C. and 40°C., but are somewhat difficult to use in every-day work. Graphs representing Pexton and Badger's data in a form readily interpreted for everyday use are shown in Figs. 1 to 5 in the paper.

An extremely valuable contribution to the literature may be found in a paper by Van Krevelen and others in which the problem is considered as one of ionic equilibra, and it is possible to calculate the vapour pressures of ammonia, carbon dioxide and hydrogen sulphide. when these are the only constituents present. Results obtained by Van Krevelen are in close agreement with those given by Pexton and Badger. Information of a rigorous nature is therefore available leading to the evaluation of the vapour pressure of ammonia above solutions used in gasworks ammonia washers. It is important, however, to apply such data accurately and it may be of interest to discuss this aspect.

Use of Fundamental Data in the Design of Washers.

With the use of water on a washer, ammonia is absorbed as carbamate, carbonate and bicarbonate from reaction with the carbon dioxide absorbed from the gas. Under these conditions only very small amounts of fixed ammonium salts

* From a recent paper presented to the Manchester and District Junior Association of Gas Engineers.

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exist and for the purpose of the argument it is assumed that no fixed salts are present.

From the analysis of a number of site tests it is apparent that (as stated earlier) the carbon dioxide in the gas does not attain equilibrium with that in the liquid. When, therefore, a test of a washer is undertaken, samples of the liquor from each bay may be analyzed for carbon dioxide, ammonia and hydrogen sulphide and the CO_2/NH_3 ratio estimated. This ratio may be expressed thus:

$$R = \frac{(CO_2)}{(NH_3) - (\frac{1}{2}H_2S)}$$ The concentrations being expressed as equivalents. . (7)

From this value the vapour pressure of ammonia from each bay liquor sample may be found from the curves prepared from Pexton and Badger's data or may be calculated by the method detailed by Van Krevelen.

When faced with the design of a washer to specified conditions the engineer has no values for the R ratio of the liquors and it will be clear that some information is required concerning the relation between ammonia and carbon dioxide absorption in the washing medium.

Tables 1 and 2 give full information concerning liquor analyses from a number of tests and when plotted as NH_3 versus CO_2 concentration in liquor indicate an approximately proportional relationship. A similar empirical relationship appears to exist between NH_3 and H_2S in the liquor and from Figs. 6 and 7 in the paper it is possible to predict the R ratio of a liquor accurate within the limits of practical engineering design.

Contact Time

Dr. Eymann investigated the relative velocities of solution of CO_2 and H_2S and noted the importance of time contact between gas and liquor. He found the ratio of rate of absorption of H_2S/CO_2 to be of the order of 2.2 through small undisturbed liquid surfaces and for finally divided droplets (sprays in empty vessel) about 85, these ratios applying to contact of pure gases with the liquid surfaces. For coal gas mixtures the rate of absorption of H_2S is given as 17 times that for CO_2.

Residence Time

Carbon dioxide absorbed simultaneously with ammonia will take part in reversible reactions within the liquid itself, and the carbonate/carbamate reaction is discussed by Key. Key points out that the reaction is very slow and may take days or even weeks to reach equilibrium. Silver discusses the absorption of carbon dioxide in detail and refers to the continuance of reaction in the liquid in the bay sumps, the effect on the vapour pressure of CO_2 and consequential increase in solubility of both carbon dioxide and ammonia. It is also shown that in ammoniacal solution the value of the mass transfer coefficient for CO_2 increases with NH_3 concentration.

Liquid/Liquid Extraction

A short time ago consideration was given to the various tried methods for the treatment of gasworks effluents and their disposal. The literature on the subject is very extensive and it would appear that no single aspect may be applied nationally and, quite apart from the success or otherwise of a particular method of treatment, the problem is peculiar to any one works and district. In view of the complexity of the matter it was decided that it would be unwise to work rigidly on one particular process of liquor treatment but to obtain fundamental data of a practical nature useful in this regard but of more general application.

Solvent Extraction

Many examples of solvent extraction are given for the removal of phenols from gasworks liquor, *e.g.*, benzole washing and the use of butyl acetate, and it was decided to investigate the various aspects of design for columns used in the counter current extraction of a liquor with a suitable solvent. Since many of the solvents are costly the question of their solubility in liquors and therefore their recovery extended the range of investigation.

The results from such work would provide useful basic data for liquid/liquid extraction processes generally apart from any direct application for the treatment of gasworks liquors. Recovery of absorbed solvent in the washed liquor or raffinate in a bubble tray column would provide further data concerning such processes and would be of useful application in other directions.

Choice of Solvent

A number of suitable solvents are given and of these, methyl isobutyl ketone and isobutyl acetate appeared to be most suitable.

It was decided to use methyl isobutyl ketone (M.I.K.) because of its greater solvent value for polyhydric phenols and the absence of losses due to hydrolysis. One disadvantage was its greater solubility in water, but in the course of further investigation it was found that the recovery of solvent from the raffinate could be easily carried out and a laboratory scale distillation gave the following figures: 500 c.c. of water plus 10 c.c. of ketone were distilled in a 12 pear column and all the ketone was recovered with only 3 c.c. of water in the distillate.

Extraction in Experimental Column.

A ring packed glass column, 1 in. in diameter and 3 ft. high, was made up in the laboratory and arranged for feeding with methane and liquor in counter current flow from a constant head. A number of different rates and ratios of solvent to liquor were tried, but it was apparent that the height of the column was less than one theoretical stage, and work was discontinued.

It was decided to build a column 10 ft. high by 4 in. diameter, using standard Pyrex units. The packing was formed of ½ in. diameter glass Raschig rings and a stainless steel diffuser unit for the admission of the solvent or dispersed phase was arranged at the bottom of the column, projecting above the packing support. Liquor and solvent were fed to the plant from constant head tanks and an adjustable leg enabled the interface level to be adjusted.

Projected Work.

It was intended to use the column to find the H.E.T.S. (height equivalent to a theoretical stage) for such a system and work was undertaken to relate extraction efficiency to the number of stages, on a laboratory scale. The investigation was limited to one and two stage extraction—a three stage extraction was tried but the third raffinate, even in the case of ketone/phenol ratio = 1:15, contained 0.005% phenol only. The extractions were carried out in simple separating funnels, ketone and phenol solutions being thoroughly mixed and two layers, raffinate (bottom layer) and extract were separated. A solution containing 0.4% phenol was used throughout, the ratio ketone/phenol being varied from 1:15 to 1:5.

Experimental Results.

Although the experimental plant had been at work for only a few days when the paper was prepared it was considered that interest would be added to this section if a result could be included and the following trial runs were undertaken. The figures are given without comment for obvious reasons, and it remains to be seen how they will be affected by more complete data published in the future.

TABLE I

Test No.	Flow Rate (gal. per hour)		Phenol Balance (lb. per hour)			Removal %
	Solution	M.I.K.	In Feed	Extracted*	In Extract	
3	36.85	5.75	11.490	1.081	1.060	72.5
4	60.35	11.65	2.390	2.004	1.810	84

* Difference between feed and raffinate.

The work will be extended to the use of actual gasworks liquors and various solvents will be tried. It has not yet been possible to test the efficiency of the 12 tray column for extraction of the small amount of dissolved ketone in the raffinates, but the two aspects (liquid extraction and ketone recovery) are considered of parallel importance and the overall value of the project will become evident as the investigation continues.

Gas Cooling

In a previous paper by the author a method for the design of gas coolers was discussed and the results of tests given for experimental coolers of the horizontal and parallel gas flow types. It was stressed that the tests were concluded under similar conditions to those prevailing on the works and the

endeavour was to predict accurately from practical conditions.

The design approach referred to above was first published by Colburn and Hougen and brought to the attention of the gas industry in this country by Silver. Redman enlarged on the possibilities of the method on theoretical grounds and suggested that the logical reasoning of the originators assisted the reader in a full understanding of the somewhat complex problem of the cooling of gases and vapours.

Colburn and Hougen showed that a heat balance may be made, equating the heat absorbed by the cooling water to the sum of the sensible heat transferred by cooling the uncondensed gas and the latent heat corresponding to the amount of vapour transferred by diffusion. The equation may be written:—

$$h_s(t_g-t_c)+KM_v\lambda(p_v-p_c) = h_o(t_c-t_w) = U.\Delta t \quad \ldots\ldots (8)$$

where: h_s = sensible heat transfer coefficient.
t_g = gas temperature.
t_c = condensate surface temperature.
t_w = water temperature.
K = molar mass transfer coefficient.
$M_v\lambda$ = molar latent heat.
p_v = vapour pressure.
p_c = vapour pressure at t_c.
h_o = combined heat transfer coefficient (other than gas film).
U = overall transfer coefficient.
Δt = temperature difference (gas and water).

The rate at which heat is transferred per unit area or $U\triangle t$ is determined for a number of points in the cooler and the total surface area determined by plotting $U\triangle t$ as a reciprocal against the point values of q, the area under the curve being the surface required, according to the general equation:—

$$dA = \frac{dq}{U.\Delta t}$$

Results published concerning the cross flow cooler indicated that a surface area of 63.4 sq. ft. was required to cool the gas mixture from 160°F. to 53°F. at a rate of 4,000 cu.ft. of gas per hour at S.T.P. The gas was not fully saturated and tests showed the dew-point to be 156.5°F. The actual area of the cooler was 63.95 sq. ft. and attention was directed to the calculated surface of 63.4 sq. ft. and the virtual agreement between the two figures.

Since the publication of these results it has been pointed out that a possible source of error exists regarding two aspects of the analysis of the test. Firstly, the water temperatures as found were used and not those obtained by intermediate heat balance and, secondly, it was incorrect in principle to assume that the partially saturated gas was cooled by sensible heat conduction down to the satuation temperature of 156.5°F. and that cooling and condensation then took place as in a saturated gas to 53°F. With regard to the water temperatures it is stressed that it was desired to produce actual working conditions so far as possible and to reproduce those temperature gradients likely to be met with in a cooler of this type.

Further calculations in the paper show the magnitude of any fundamental inaccuracy and it would appear that no great differences exist. The use of Bras' method for calculation of the cooling surface in a condenser for unsaturated gases and vapours is introduced. Colburn and Hougen's method may be used for both saturated and non-saturated gases, but in the latter regard, use of the Bras' modification would be the more rigorous approach.

DISCUSSION

Mr. H. G. Cooper, Simon-Carves, Ltd., said he did not think Mr. Pollard had stressed quite enough the peculiar characteristics of the absorption which took place in the ammonia washer. The relative rate of absorption of ammonia was very high, and next to this came the H_2S absorption. CO_2 absorption appeared to be a very much more uniform and slower process; in fact, if one took an ammonium sulphide solution and bubbled crude coal gas through this, the tendency was for H_2S to be expelled with an almost uniform absorption of CO_2 until equilibrium was obtained. Mention had been made of a graph which correlated from four independent washing plants, the % CO_2 against the % (NH_3—½ H_2S). To his mind, the results obtained must be influenced by the percentage of CO_2 in the gas and the overall efficiency of the washers, both for ammonia and CO_2 absorption. Was he not correct in assuming, therefore, it was more of a coincidence that these results tended to give an approximate straight line?. Perhaps Mr. Pollard could explain what purpose he had in mind in correlating the factors of % CO_2 as against the % ammonia not combined as ammonium hydrosulphide.

Another point with regard to ammonia washers, was the type of surface area, which was very important, and many people imagined that an almost uniform value of Kg was obtained for the nominal surface area offered, whereas in practice different types of packing, *e.g.*, wooden lath packing, brush filling and ring packing, did appear to give quite independent values for Kg with equal liquor recirculation rates per sq.ft. of plan area. These results appeared to be closely related to a function of the actual wetted surface areas offered by the packing.

Of further interest, was Mr. Pollard's reference to liquid/liquid extraction. They themselves had a plant at a works in the Southern Gas Board area which had been working for almost two years. The method there of efficiently washing the liquor, was in each stage to pump liquor from the base of the washing bay and feed this back via one cell of a multi-cell pump to an injector which entrained solvent from the top of that bay to the base of the washer. In this way, a very high degree of dispersion of solvent within the liquor was effected and a high stage efficiency thereby obtained. The particular washer referred to had six washing effects. They considered that this design of washer lent itself to a very high degree of phenol and H.T.A. removal compared with a single tower, packed or otherwise, and also offered the advantage of allowing, in the design, for the formation of what they termed 'permanent' emulsion. The system incorporated contraflow of liquor and the solvent through the several washing bays. Mr. Pollard had referred to two-stage washing results, and perhaps he would be good enough to explain further what was meant by two-stage extraction as against one-stage extraction in the particular experiments referred to.

Finally, with regard to condensers, they had investigated very thoroughly this question, and recently had issued a brochure including much of the material referred to by Mr. Pollard, but they had developed further than this a graphical method of obtaining the overall heat transfer. The information was based on that given by Colburn and Hougen, referred to by Mr. Pollard, and which, without resorting to graphical methods or approximations, was most tedious. In their investigations they did try to make use of Silver's method in general design, but to incorporate the water side coefficients in this formula was most difficult when employing Hougen's method in which the heat transfer on the water side is proportional to $\triangle t^{\frac{1}{3}}$. Further, with regard to Silver's method, difficulties could arise in assuming a uniform value of h_s for a given gas velocity and condition, particularly in the applications of this method for unusual conditions. One example of these would be when covering only a portion of the usual gas temperature range.

Another difficulty was in assessing a correct value in the design of condensers when unusually low or high water rates were to be employed.

Mr. C. H. Bamber, North Cheshire Group, said, referring to the design of ammonia washers, he was of the opinion that equilibrium was rarely ever attained in these plants. The author of the paper had devoted all his attention to the major reactions occurring between the washery agent and the gas, but had made no mention of the side reactions which took place especially in the presence of oxygen in the gas. These had not been discussed at all, and in Mr. Bamber's opinion were very important and would affect the design of washing plant. He referred to the formation of fixed salts such as ammonium thiocyanate, ammonia thiosulphate, etc., which were formed in the washer when oxygen was present, and were in fact formed in appreciable quantities even when the time contact was relatively short. By removing ammonia as fixed salts partial pressures would be affected and equilibrium conditions altered.

He agreed with Mr. Cooper that the order of absorption in a washer could be considered to be first ammonia, then sulphuretted hydrogen which later may be turned out by carbon dioxide in the gas even to the point of complete

elimination of sulphuretted hydrogen if time contact of carbon dioxide concentrations were high enough.

On the subject of extraction of liquids and solids from solution by the use of solvents, he had had considerable experience during the manufacture of explosives some years ago. They devised a continuous process using mixing vessels with agitators and separating vessels to control and direct the flows. Equilibrium was attained in each vessel and by using counter current principles a high degree of extraction was obtained. Solvent losses were kept low and about six stages were sufficient in many operations although they did on occasion use as many as twenty stages. He did not feel that any success or high degree of efficiency could be reached using a tower form of extractor as described in the paper.

Mr. R. Pollard, replying, said Mr. Cooper considered that the mechanism of absorption of the constituents of ammoniacal liquor had not been given enough prominence in the paper. It was always difficult to decide on the quantity of such background material to include in a paper of this type and in any case a full source of information on the subject was available in the literature.

The section on ammonia washers presupposed a broad knowledge of the principles of gas washing and divided roughly into two themes. The first was concerned with the establishment of the correct equilibrium data to use for the estimation of the partition factor while appreciating that two equilibrium conditions were postulated—the internal equilibrium between the constituents in the liquor itself and the equilibrium between the constituents in liquid and gaseous phases. The second part was devoted to a discussion on the difficulties associated with the design of an ammonia washer when it was necessary to predict the analysis of a liquor, having regard to the complex reactions and adjustments of internal equilibrium taking place within the washer sumps during the passage of the washing medium through the plant.

Providing a reasonable prediction might be made of the quantity of carbon dioxide and hydrogen sulphide absorbed in a particular instance, the accurate data of Pexton and Badger might be used to determine a practical partition factor after establishing R as defined in the paper. Pexton and Badger had proved in their original paper that a vapour pressure of ammonia should be estimated from that ammonia which had not combined with its equivalent hydrogen sulphide to form ammonium hydrosulphide. With regard to the partial pressure of carbon dioxide in the gaseous phase it would appear, said Mr. Pollard, that under the conditions pertaining, the resistance to absorption on the liquid side was of considerable consequence, the gaseous concentrations in coal gas mixtures having the lesser effect.

A discussion of the values of the mass transfer coefficients (*Kg*) was outside the scope of the paper but from the definition of *Kg*, its value was independent of the type of wetted surface. The effective wetted surface area contained in unit volume of washer was a mechanical function controlled by the designer and followed from a consideration of the manifold aspects of surface area per unit volume of packing, ease of irrigation, cost and pressure loss.

Extraction by means of a single solvent in a column, the solvent and solution entering at opposite ends, was termed countercurrent extraction. The most obvious method of design was analagous to the well-known procedure adopted many years ago for absorption and distillation processes involving the concept of stagewise effects. With the introduction of a packed column this analogy was not strictly correct since the concentration actually changed differentially with height. However, provided specific H.E.T.S. data were available the errors involved were probably not of sufficient magnitude to affect materially a practical engineering design and the method was extensively used in practice, in view of the more complex design methods necessary for the ideal approach. Knowledge of the effect in different numbers of stages, then, might be compared with the performance obtained in a packed column at different rates, and values for the H.E.T.S. obtained applicable to specific materials and conditions. This was the method of approach outlined in the paper and confirmed by the use of Silver's equation for equilibrium conditions.

Mr. Bamber was correct when he said that equilibrium was rarely attained in ammonia washers. There was no suggestion in the paper to dispute the statement and it might be of value to state that having obtained a true equilibrium vapour pressure of ammonia in the manner described above, the nearness to equilibrium conditions in the washer was determined by the bay efficiency and for various reasons this might vary from 0.5 to above 0.9.

It was stated in the paper that, with the use of water, the formation of fixed salts was invariably of a very low order and might be ignored in washer design. The use of liquor already containing fixed salts was, of course, a different problem and it was necessary to have access to equilibrium data accounting for the incidence of these salts. In both cases the effect of the formation of ammonium thiocyanate and thiosulphate might safely be ignored, although the tower scrubber had been quoted as producing liquors higher in these constituents than liquors from stage washers. Again, for a given weight of total ammonia, the equilibrium vapour pressure of ammonia in solution would be lower if some of the ammonia was fixed, so that to ignore very small concentrations was in fact a safety margin in design.

It was suggested that there was no 'order of absorption' but rather simultaneous absorption of the various constituents at different *rates* of absorption. Silver discussed the absorption of carbon dioxide in ammoniacal solution at great length and for the *p*H values normally met with in ammonia washing the concentration of free ammonia had the greatest effect on the rate of absorption of carbon dioxide, the formation of carbamic acid becoming the controlling reaction. As Silver pointed out, the continuance of reaction within the bay itself added a further complication and the capacity of the sumps or residence time should be considered. This aspect was acknowledged in the paper with the possible reservation that residence time might be a critical factor only when consideration was given to single stage washers or the gas outlet (water inlet) bay of a multi-stage washer.

If the H_2S/CO_2 ratios for the weak liquors (bay 1) shown in Table 1 of the paper was plotted with time as abscissa, the latter quickly became asymptotic suggesting that the capacity of the bay sump became less important as the number of stages was increased above one. With regard to Tables 1 and 2 of the paper, the total sump capacities ('washer liquor volume') where equal, related to 12, 6, 12 and 8 bays respectively, and knowledge of this information should render the tables more useful.

Since the publication of the paper it has been realized that no explanation was given of the method of use of the graphs, Figs. 1 to 5. The procedure is as follows: from NH_3 strength ($NH_3 - \frac{1}{2}H_2S$) proceed vertically to the curve, horizontally to the line representing R = 1, vertically downwards to the appropriate R value and horizontally for the required vapour pressure.

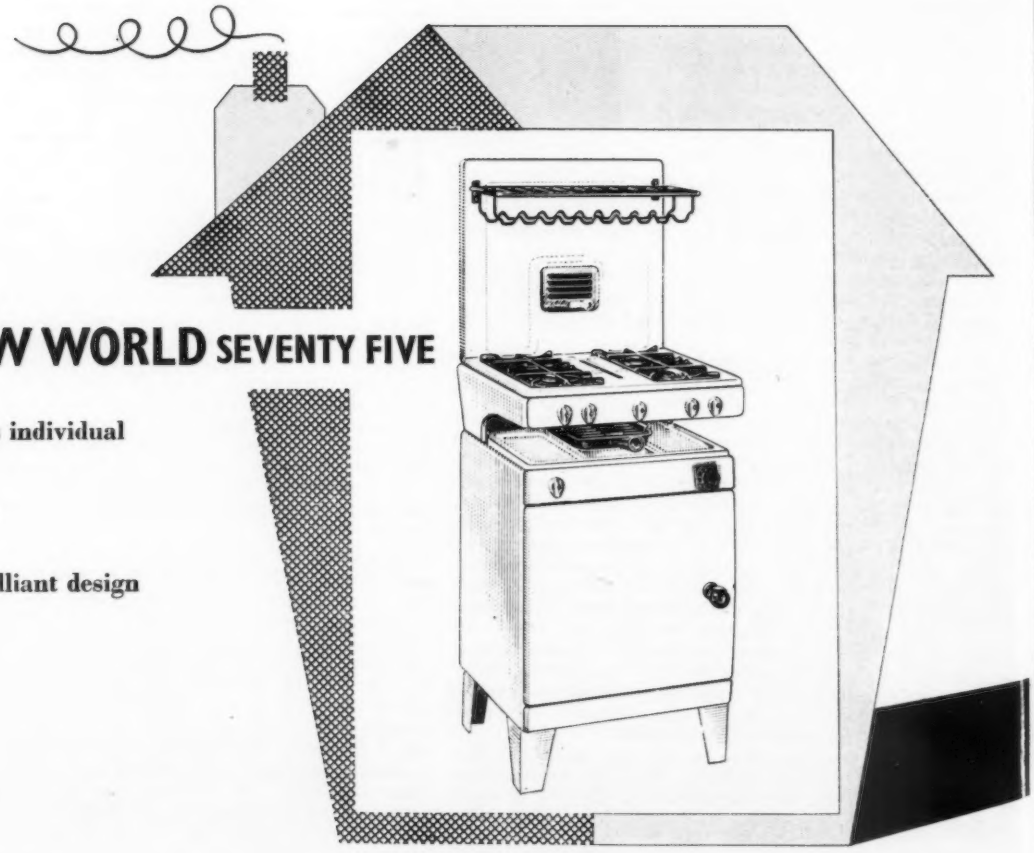
SHELL'S NEW CHEMICAL COMPANY

All Shell's chemical manufacturing and marketing activities in the U.K. and Eire are to be concentrated in one company, to be called Shell Chemical Co., Ltd. With an authorized capital of £10 mill., it will take over the activities of Shell Chemical Manufacturing Co., Ltd., and Shell Chemicals, Ltd., which include the manufacture and marketing of detergents, solvents, resins and agricultural products, and a wide range of chemical intermediates. Petrochemicals, Ltd., recently acquired by Shell Chemicals, Ltd., will become a wholly-owned subsidiary of Shell Chemical Co., Ltd., and will continue its chemical manufacturing and marketing activities as a separate entity.

The Board of Shell Chemical Co., Ltd., will be constituted as follows: Chairman, Mr. F. A. C. Guepin; Vice-Chairman, Mr. W. F. Mitchell; Managing Director, Mr. L. H. Williams; Commercial Director and deputy to the Managing Director, Mr. G. H. W. Cullinan, previously General Manager of Shell Chemicals, Ltd.; Executive Director, Manufacturing, Mr. E. le Q. Herbert, the Managing Director of 'Shell' Refining & Marketing Co., Ltd. The other Directors of the Company will be Mr. J. W. Platt, Sir Robert Robinson, O.M., F.R.S., Mr. A. D. Koeleman, Dr. M. A. Matthews and Mr. F. Mackley.

Until further notice the marketing activities carried out by Shell Chemicals, Ltd., hitherto and by Petrochemicals, Ltd., will continue to be directed from their present addresses.

VALUE FOR MONEY

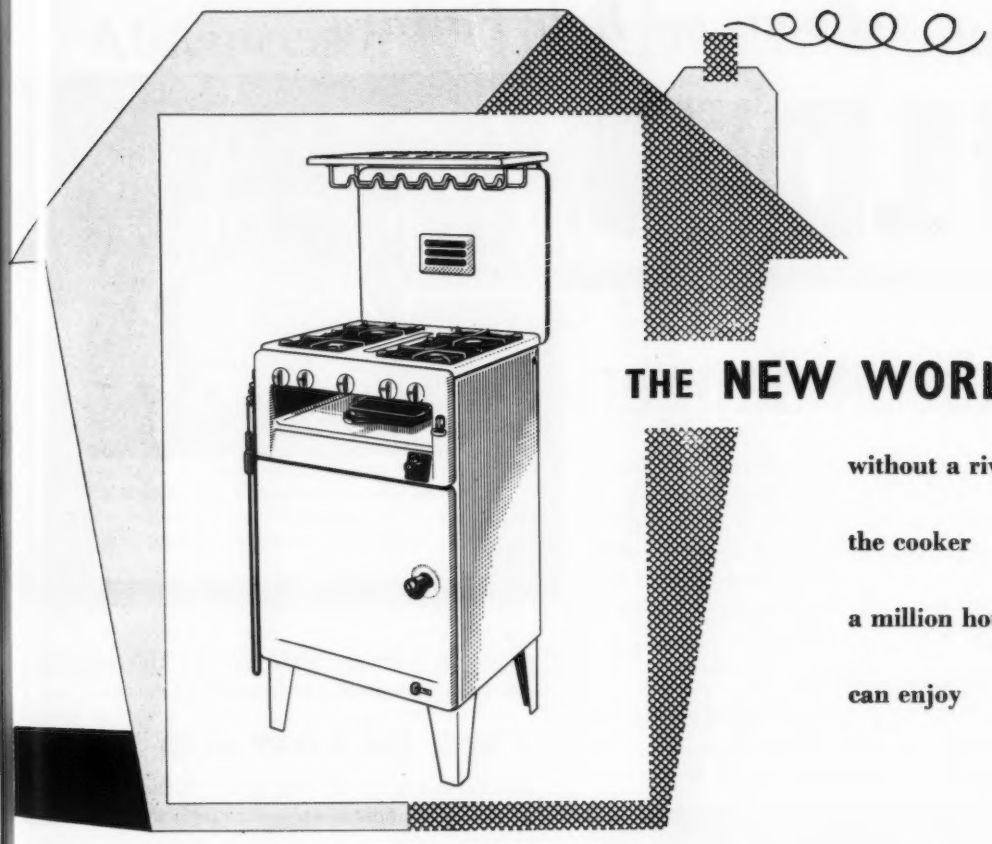


THE NEW WORLD SEVENTY FIVE

with its individual

styling

and brilliant design



THE NEW WORLD S4183

without a rival —

the cooker

a million housewives

can enjoy

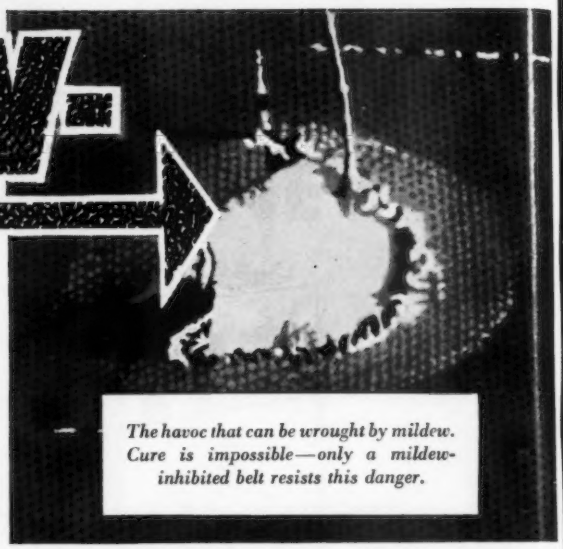
MAKES THEM EASY TO SELL

SELL A NEW WORLD EVERY TIME!

PRODUCT OF Radiation Ltd

Focus on Belt Failure

MILDEW—



The havoc that can be wrought by mildew. Cure is impossible—only a mildew-inhibited belt resists this danger.

The unseen danger

First striking a conveyor belt where it can't be seen – beneath the cover – mildew often remains unobserved and unsuspected, reducing the belt carcass to pulp. Mildew flourishes under these conditions: darkness, dampness, lack of ventilation, uniform and moderate temperatures, and periods of idleness. Some of the conditions conducive to mildew are always present.

MILDEW AND GOODYEAR

How can the danger of mildew be overcome? There is one proved and effective method – that is to fit a Goodyear belt. Every Goodyear conveyor belt built during the last twenty years has been inhibited against this cancerous growth by an exclusive Goodyear process.

It is not only in conditions like these that mildew spores breed and multiply, wreaking havoc with a belt. Unless inhibited during manufacture, belt life may be short on any installation.

A BELT FOR EVERY NEED

But there is more to building a belt than protecting its carcass against mildew, it must be built to match specific operating conditions. There's a Goodyear belt for every need, a belt with properly designed carcass and correctly compounded cover to ensure long-lasting service.

Made by skilled craftsmen from top quality goods and backed by world-wide experience, research and leadership, each Goodyear conveyor belt is the best your money can buy – at the lowest cost per ton conveyed.

COMPLETE GOODYEAR SERVICE

Skilled Goodyear Representatives will be glad to discuss your conveyor problems. Furthermore, Goodyear have available a mobile service for on-the-spot splicing and repairs. If you would like to know more about Goodyear Conveyor Belting and Goodyear service, write to The Goodyear Tyre & Rubber Company (Gt. Britain) Limited, Wolverhampton.

Because top quality is built into every Goodyear belt you will find your conveying costs go down when you fit Goodyear.

GOODYEAR INDUSTRIAL RUBBER PRODUCTS

CONVEYOR BELTING · V-BELTS · TRANSMISSION BELTING · HOSE

Absenteeism is Time Lost to Production

In this, the third article of his series, our Industrial Relations Correspondent discusses absenteeism in relation to conditions of work and the need for effective records and control

ABSENTEEISM may, for our present purpose, be defined as time lost from work other than time lost by leave of the management (such as holidays and occasional leave), or on account of industrial disputes.

In other words, absenteeism is time lost to production. From that point of view, it is a waste which this country, or any industry within it, can ill afford at any time. It raises the cost of production by introducing the necessity to pay unproductive wages either to the absentee or to his substitute, or both; and by disruption and delay in the productive process.

The measure of it, the causes of it, are difficult, if not impossible, to gauge without regular records and reliable statistics. Hunches and guesses may be wide of the mark; they are, in any case, an unreliable guide to the solution of the problem.

Can Absenteeism be Controlled?

Absenteeism in a unit of employment cannot, of course, be adequately controlled, let alone minimized, unless the causes and circumstances which occasion it are more or less known. It would appear that strict rules and regulations, where they have been applied, do not always have the desired effect. Many American empoyers tried them during the second world war, but, apparently, to little effect[1] In conditions of full employment it cannot perhaps be expected that they can be very effective, although the loss of pension and co-partnership rights might be a deterrent in the case of chronic absentees; dismissal in such extreme cases might be the only possible cure. But rules and regulations must be intelligible and fair if they are to be truly effective; and their application must be based on adequate knowledge of most, if not all, the factors involved.

Our approach to the problem must be based on the realisation that it is an exceedingly complex problem. Action based on hasty generalizations will not only not solve the problem, but might well aggravate it. And costly labour turnover could well be a corollary result.

Importance of Records

The causes and incidence of absenteeism cannot be ascertained, unless adequate and suitable records are kept. And they must be kept strictly up-to-date if they are to be of much use to the employer and to the research department. It is essential that within the same undertaking, the same kind of records are kept; otherwise it will be impossible to compare and contrast the incidence of absenteeism between one department or workshop and another; and between one section of employees and any other section. Where firms and industries employ only a handful of men, or where the employer feels that absenteeism is not a serious problem, it may well be that elaborate records are not necessary. But where firms and industries are large, and absenteeism is a serious problem, then up-to-date and fairly detailed records are essential.

Such records should supply the following information:[2]

A. *The Monthly Absence Summary* (*Separate for Men and Women*)

This should show:—

1. the time lost for any reason. This is sometimes called the overall absence rate and can be given either in man-hours or in man-shifts.
2. how often an employee is absent—also called the frequency rate.
3. the alleged causes of absenteeism.
4. the splitting-up of absences for
   - (a) sickness, alleged or real, uncertified and certified;
   - (b) industrial injuries;
   - (c) all other absenteeism without permission of the management;
   - (d) categories of employment—*e.g.*, professional and administrative; clerical; technical; sales staff; manual workers—each category being further sub-divided into males and females.

B. *The Individual Card*

The British Institute of Management recommends that the card 'should be a complete history of the individual in relation to his attendance at work, and at least one year's records should be available on one card.' On the card will also be shown the reasons for the absence, general comments thereon, and action taken by management.

Firms can easily devise record cards that will satisfy the requirements stated. But some sort of uniformity throughout industry in the methods adopted is, of course, desirable for the purposes of comparison and relative analysis.

The specimens reproduced on p. 462 are recommended by the British Institute of Management:[3]

The causes of absenteeism are manifold in number and of great variety in character. It is of value and interest to examine the most common causes.

Respiratory Ailments

Investigations have shown that a high proportion of absenteeism is due to the common cold, and other respiratory ailments. It would also appear that women are more prone to this type of complaint than men. A great deal of useful propaganda can be instituted in industries in respect of these complaints. The use of handkerchiefs when sneezing, the avoidance of careless coughing and spitting, sufficient sleep, avoidance of crowds, the observance of ordinary laws of health. Education of the workers by management in simple language in these elementary precautions should go some way both to prevent this type of infection and to avoid its spreading. Where medical officers are available, it could be left to them to spread the gospel of clean habits and of avoidance of unnecessary sickness risks.

Wherever possible, recruitment should have regard to the health of the prospective employee, accompanied where practicable by certification of health. People suffering from chronic diseases cannot be expected to be such regular attenders as healthy employees.

It is to be expected that employees who are placed in employment unsuitable to their talents or health or physical qualities will be more prone to absenteeism than those properly selected. Boredom with one's work is a fruitful source of absenteeism.

Married Women

Married women with children and other domestic responsibilities will be more prone to absenteeism than single women without such responsibilities. This fact has to be faced; and the work on which they are engaged arranged correspondingly. In order to obviate adverse effects on other employees, arrangements might have to be made for special leave for them for shopping, collecting their children from school, and the like. Employers might consider that these concessions would be preferable; they would be generally known among other employees; and they would not have such a generally unsettling effect, as wholesale snatching at unauthorised leave without adequate control and explanation. 'It is the irregularity more than the amount of voluntary absence which causes inefficient working and loss of output'.[4]

New Employees

Unless there are good induction methods practised by a firm which make new employees feel at home in their new place of employment; which make them feel that they 'belong'; which make them realize that they are members of a team—they will tend to become restless and lose interest; and this sense of

1 Industrial Relations Handbook, Apsley and Whitmore, Dartnell Corporation, Chicago and London, 1949, p. 757.

2 On the subject of records, the author is indebted to the British Institute of Management publication: 'Absence from Work', 2s. 6d., 1955. For greater detail, the reader is referred to this publication.

3 Reproduction by kind authority of British Institute of Management, P.O. Box 483, 8, Hill Street, London, W.1, to whom enquiries should be addressed.

4 National Coal Board, Report and Accounts, 1951. § 38. This, of course, does not refer to married women, but is a general statement.

MONTHLY ABSENCE SUMMARY — MEN/WOMEN

NAME OF FIRM ..... ADDRESS .....

INDUSTRY ..... PERIOD ..... 5 or 5½-day week .....

	Supervisory and Executive	Clerical	Manual and all Others	Technical	Totals
	Men	Men	Men	Men	
Average Strength					
Total No. Absences					
Frequency Rate					
Total Man-hours Required					
Total Man-hours Lost					
Absence Rate					
Hours Lost—Sick Absence Rate					
Hours Lost—Accident Absence Rate					
Hours Lost—Other Reasons Absence Rate					
Total Overtime Hours Worked					
Total Hours Worked including Overtime					
Average Hours Worked per Employee (including overtime)					

1. Absences of more than 13 weeks duration should be *excluded* from all records of hours lost and hours required.
2. Absences of under one hour should be excluded.
3. Overtime hours should be excluded from all records unless specifically mentioned. *Average hours worked per employee* is the only record that includes overtime hours worked.
4. The unit of recording may be the man-hour *or* the half man-shift.
5. Frequency rate $= \frac{\text{Total number of separate absences}}{\text{Average strength}}$

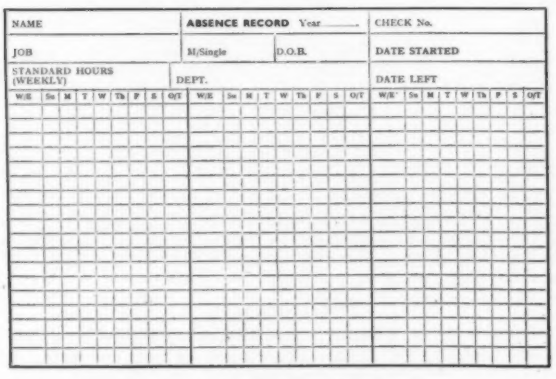
   Absence rate $= \frac{\text{Total man-hours lost through all absence}}{\text{Total man-hours required}} \times 100$

   Note.—Absence rates for separate categories (sickness, etc.) are calculated similarly.

frustration might well be reflected in absenteeism, if not in losing their services altogether. The Anglo-American Reports on Productivity generally emphasize the importance of proper methods of induction and of inducing into employees the conviction that they are valuable and valued members of a team engaged with others in a common effort to make their firm strong and prosperous. If an employer is indifferent to what his employees think of the firm and its organization and management it would be rather quaint on his part to expect the employees to take a vital and enduring interest in its prosperity.

Where the physical conditions of work are dirty, or draughty, or badly lit, or poorly ventilated, or poorly heated, the laws of nature will step in, and there will be a great deal of unnecessary absenteeism on account of colds, rheumatism, eye-strain, and so on. It pays dividends to the employer, therefore, to ensure that the actual circumstances in which employees work should be as free of these avoidable defects as possible.

The need has been emphasized, in production processes, of effective working groups. Each group should be large enough to accomplish a recognizably distinct component part in the total operations of the factory; and small enough to give its


NAME | ABSENCE RECORD Year ..... | CHECK No.

JOB | M/Single | D.O.B. | DATE STARTED

STANDARD HOURS (WEEKLY) | DEPT. | DATE LEFT

W/E	Su	M	T	W	Th	F	S	O/T	W/E	Su	M	T	W	Th	F	S	O/T	W/E	Su	M	T	W	Th	F	S	O/T

Individual record card (front).

ABSENCE RECORD

Absence	General Comments	Action Taken	Signature

Individual record card (back).

1. **Overtime**—This column is to be used for recording total overtime hours worked in any one week. Because it has been found that absence rates vary considerably with total hours worked it is strongly recommended that records be kept of fluctuations in working hours due to overtime.

2. **Back of card**—The back of the card is for comments on the individual's absence record, together with a record of action taken. By themselves, the letters indicating reasons for absence on the front of the card are insufficient. These should be expanded to give an indication of the individual's problems and his attitude towards attendance at work. It cannot be too strongly emphasized that the control exercised by the supervisor is one of the most important factors in reducing the incidence of absence. The absence record card should be the supervisor's tool. Properly used, it is an invaluable source of data concerning the individual.

3. **Collecting of figures**—It is not proposed to make any recommendations as to the procedure which undertakings should follow in collecting data from which the absence figures may be compiled. Each concern should adopt the method best suited to its own conditions. The essential requirement is that all undertakings should keep absence records on a uniform basis to ensure comparability of results.

individual members the sense of personal comradeship and the feeling that each has within his own group a significant part to play. The organization must then provide for the collaboration of these 'primary' groups in larger groupings, and so on until at the topmost level all the threads are brought together for the factory as a whole.[5] There is no doubt that certain working groups are effective, and others not. Factors other than size which might enter into this question are the segregation of the sexes and the mixing of the old with the young within the same working group.

Who can gauge adequately the impact of the supervisor's personality on the working group? If he or she is grumpy, or cantankerous, or unfriendly, or unjust, or given to unkind or unjust or disloyal or vicious actions, employees will tend to keep away from such a person; not only consciously, but unconsciously, whenever they can. And that means a high degree of absenteeism in that particular section or department. Properly kept absence records should throw up, among other things, the unsuitability of such supervision. Such a supervisor is a doubtful asset in any organization.

Again, if supervision is slack and does not appear to be vitally interested in the causes and incidence of absenteeism, absenteeism will flourish and prosper unhindered.

Seasonal Variations

Ministry of Labour figures for the year 1949-1950, for example, show that absenteeism is more marked in February and March and is lowest in July and August. It is to be expected that absenteeism due to illness will be highest when climatic conditions are at their worst; and lowest when the weather is fine and warm. But saving money for holidays and festivities may also affect the issue. Money must be accumulated for the Christmas festivities and for the summer holidays; once they are over, the financial stress in the period immediately following is less acute.

Elderly Workers

One investigation[6] revealed that absence rates among men were highest in the 50 plus age group, next highest in the 20 to 30 age group (this seems to confirm what was said earlier about new employees) and the lowest absence rate in the 30 to 50 age group. In the last group contributory factors would seem to be that the men carry domestic responsibilities (wife and children, and house-buying); they are in the best years of health; and they have become used to, and settled down in, their present employment. But as age advances, the body is generally more liable to ailments and accidents; and one would expect absenteeism to rise with the age of the employee. But this need not necessarily be the case, before a very advanced age. It has been rightly said that 'as a result of higher standards of living and education, improved public health services and advances in medical knowledge, it is reasonable to expect that many people will not only live longer, but be healthier and fitter to a higher age. There is a consequent need to give them the opportunity to make the enhanced contribution which these changes have made possible.'[7]

The Chronic Absentee

There will always remain in some organizations, unless they are dismissed, the chronic absentees. They are the sad core of incorrigibles. 'The really persistent offenders', it has been said, 'who excuse themselves with barely disguised frivolous explanations, probably form a very small minority, perhaps 2%, who would normally be discharged as unsuitable, if alternative labour were available. Fairly exhaustive investigation during the war suggested that many of them were irresponsibles and oddities . . . . 2% may seem a high loss for frivolous reasons, but under present conditions we can hardly grumble at only two duds in every hundred employed'.[8] Far more serious than their individual absences might be their effect on the morale of the other employees.

Remedial Steps

Human beings of all ages are happier in an atmosphere of some discipline. Management should, therefore, make it known that it is vitally interested in keeping absenteeism down to the minimum. A system of committees of employees has been tried in some firms to induce self-discipline in this matter, on the theory that workers who, through absenteeism, throw extra work on their colleagues, would incur their active displeasure. It is not clear what success has attended these efforts; for employees might well feel that discipline, after all, is the province of management.

Some employers pin their faith on group production bonuses. Absentees would, of course, imperil group bonus earnings and would thus suffer financially themselves and cause their fellow employees to suffer similarly.

Another method which is sometimes adopted is to give bonuses for good attendances over a given period. Some employees, quite apart from any material reward, would feel a sense of pride in an achievement of this kind. Inter-departmental rivalry might well be fostered by this method.

Appointment of Medical Officers

Medical officers can collaborate with management in the avoidance of absenteeism by medical examination of employees before engagement; by interviewing absentees on their return to work; by propagating sound laws of health through talks, leaflets, discussions, and the like; and by strict keeping of up-to-date records of medical history of individuals. The cumulative effect of the influence and work of good and competent medical officers in all these matters should have a considerable effect in keeping absenteeism within reasonable limits.

Another effective deterrent to absenteeism might be the knowledge spread among employees that irresponsible absenteeism would be a bar to promotion; and, indeed, might, in bad cases, lead to demotion or dismissal. Loyalty and support constitute a two-way traffic; failure on the part of one party in these matters does not encourage the other party to continue with its support.

Effective Records and Control

The importance of keeping up-to-date records of the type mentioned earlier cannot be over-emphasized. Furthermore, the lot of the absentee must not be made too easy. On return to work, every absentee should be interviewed by management; and not be allowed to slip back to work unnoticed and without explanation. Such interviews must be conducted with great tact; but they are invaluable in making it clear that management does watch and control absenteeism; that it cannot be fobbed off with trivial excuses; and that an employee has a responsibility not only to management, but to his colleagues, and to himself and his family.

5 Christianity and Human Relations in Industry, Sir George Schuster, Epworth Press, 1951, p. 38. The reader is referred to this book for greater elaboration of the subject of effective working groups.

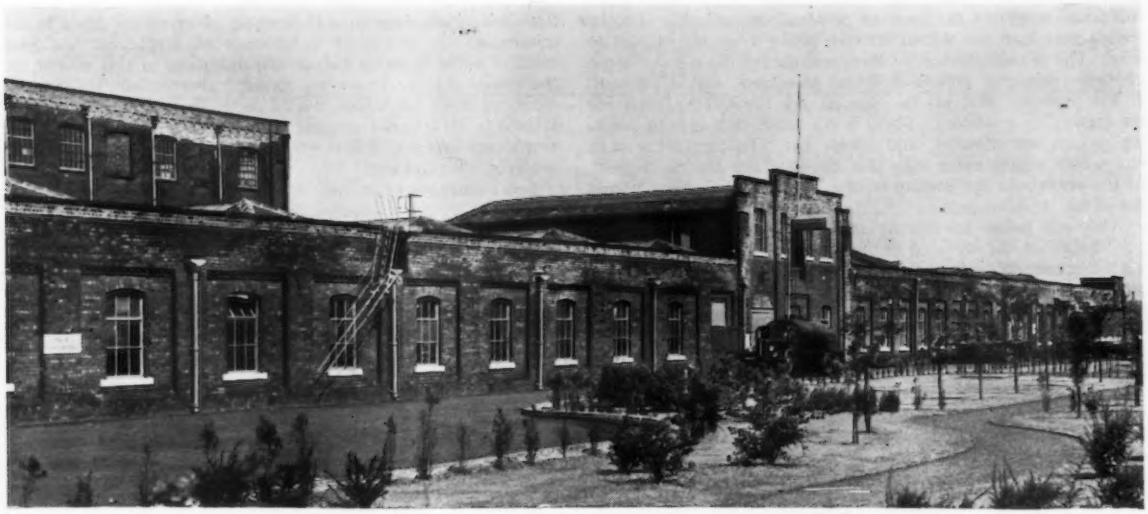
6 Hilde Behrend, Absence under Full Employment, Birmingham: Faculty of Commerce and Social Science, University of Birmingham, 1951.

7 First Report of the National Advisory Committee on the Employment of Older Men and Women, Her Majesty's Stationery Office, October 1953, p. 9.

8 G. B. Greenwood: Is Absenteeism a Problem? Journal of Institute of Personnel Management, August, 1951.

FUEL EFFICIENCY EXHIBITION

The Combustion Engineering Association is acting as joint sponsors with the National Industrial Fuel Efficiency Service of the Fuel Efficiency Exhibition at the City Hall, Manchester from October 12 to 22. In connection with the exhibition, the Association has arranged a conference on 'The Cost of Steam' in the Conference Room, Campfield Avenue, Deansgate, Manchester, on October 13 and 14. Mr. F. C. de Paula will give an address on 'The Costing of Steam Generation and Utilization', and Mr. R. P. McCulloch (Imperial Chemical Industries, Ltd., Metals Division), will deal with 'Cutting the Cost of Steam'. The conference fee, to include a copy of the proceedings has been fixed at £2 2s. for non-members, subject to a reduction of 12s. in the case of delegates from member companies. Applications for tickets to the conference should be addressed to the Combustion Engineering Association, 6, Duke Street, St. James's S.W.1. (T/N Whitehall 5536). The purpose of the conference is to show how the cost of steam in generation and utilization may be readily assessed and to show what economies can be made. The Association is holding a cocktail party on October 12, and a dinner dance has been arranged at the Midland Hotel on the following evening. All tickets for this function have already been disposed of. The Association's Stand at the Exhibition will be No. 114 (Balcony). The design and layout of the stand will be illustrative of the work of this Association and of the field in which it operates.

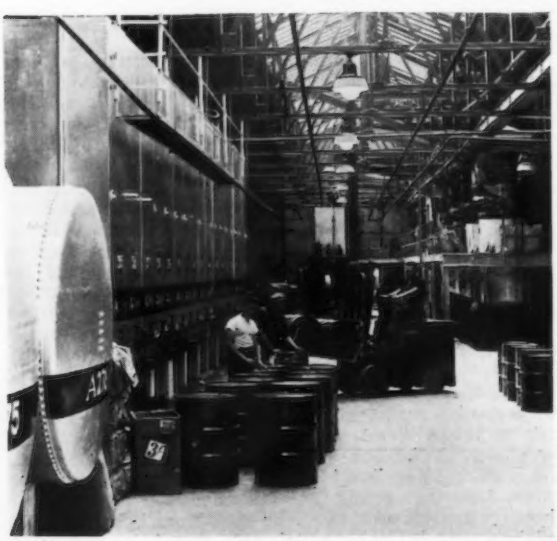


Frontage of Warth Mills (Bury) factory of Donald Macpherson & Co., Ltd.

Foochow—at the gas industry's service

APPROXIMATELY 75 years ago the firm of Donald Macpherson & Co., Ltd., commenced a service to the gas and allied industries which, during the years, has grown to such proportions that it might be considered unique. Starting as it did in the early days with the supply of the once familiar 'red oxide and stone colour' paints for gasworks purposes, the Company has now increased into a large concern with manufacturing plants at Manchester, London, and Dublin, and well-stocked depôts in Manchester, London, Birmingham, Leeds, Newport, Newcastle-on-Tyne, Sheffield, and Liverpool. The latest premises to be occupied comprise a new and extensive factory near Bury, Lancashire, covering some sixteen acres; this supplies many thousands of gallons of paint of all types, weekly, to many and varied customers among which the gas and coking industries still play a considerable part.

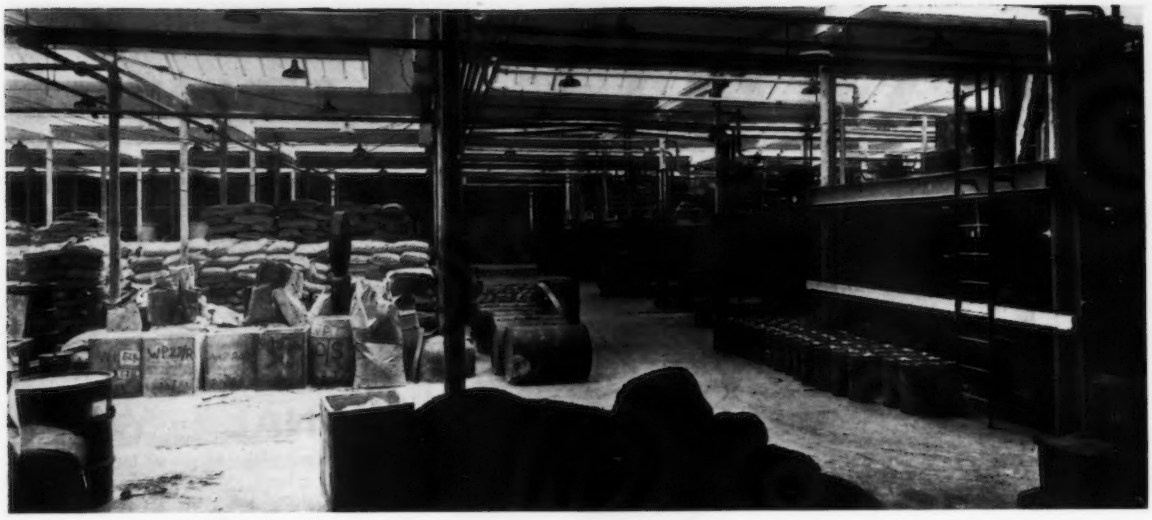
Many readers will recall an instance of this Company's activity a few years ago—their excellent range of high-heat resisting, spraying and stoving finishes, in colours, for gas appliance renovation, brought in at a time when the industry felt the need of a sales aid. During the years that followed thousands of gas fires were sprayed and stoved annually all over the country. Another instance of pioneering work on the part of Donald Macpherson & Co., Ltd., was that concerning coloured finishes for cookers, for the introduction of which the Company was very largely responsible. Before the war thousands of these appliances, originally in the old black finish, were treated for sale outright and for simple hire at many of the largest undertakings in the country, thus fulfilling a pressing need of the distribution side of the industry.



Varnish house of Bury factory showing varnish storage tanks and, on right, resin kettles in which varnish is made.

Some years before the last war, in response to a demand created by criticism that a gasholder was a 'blot on the landscape,' Macpherson's engaged in research and experimental work resulting in a range of 'permanent gasworks green' protective holder paints, of which, by now, vast quantities must have been used on gasholders throughout the country in both rural, industrial and marine surroundings. During later years, Macphersons evolved a range of new decorating types of paints, varnishes and enamels specially designed for use in engine and governor houses, works canteens, kitchens, etc., to withstand the rigorous conditions of a gasworks atmosphere.

The Company's recent move from their Cornbrook, Manchester works to the new factory at Bury, where space is available for considerable expansion, has enabled them to establish a remarkably well-equipped laboratory, where research and experimental work proceeds in an endeavour to provide even more durable types of paint for the industry. For example, a great deal of work has been carried out in this new laboratory, and in the London experimental department of the Company, on the new Foochow 'Epimac' finishes, which are based on epoxy resins. Much interest has been stimulated recently in these finishes, the introduction of which represents a major step forward in the surface coating industry. A new high level of performance, not hitherto available, may be expected from these 'Epimac' paints—combining, as they do, three important properties, chemical resistance, durability and adhesion, to a remarkable degree. Several gas boards have shown considerable interest in them and one board in the North of England has already expressed its confidence by using nearly 1,000 gallons. The new finishes will, of course, show to best advantage on such plant as concentrated



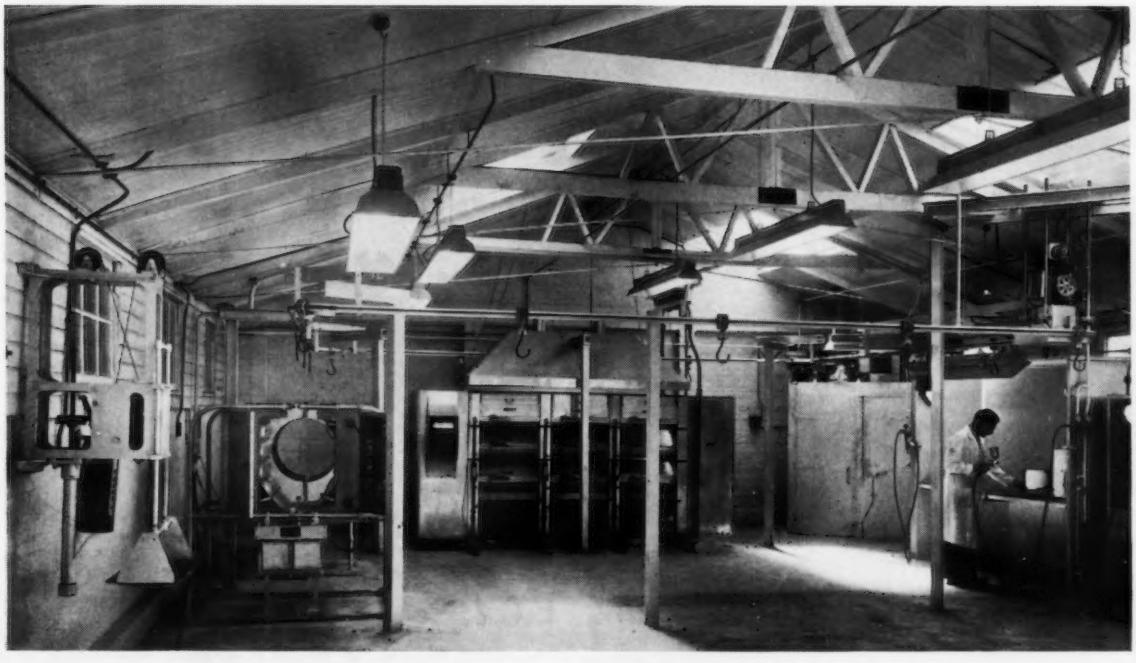
Ball mill shop at Bury factory, showing part of pigment stores and battery of ball mills.

ammonia liquor plant, purifiers and similar structures on which corrosion frequently proceeds at a very high rate, and which it has been extremely difficult to protect in the past.

The Cock Chimney works, Mitcham, of the Surrey branch of the Company, which serves the South of England, is actively engaged in the supply of paints for the gas industry, and is justly proud of its very fine experimental and demonstration shop, housing first class equipment capable of demonstrating all types of industrial finishing processes, including the hot spray method of lacquer application. Here the spraying and stoving of all types of industrial finishes may be shown. It is regularly and frequently visited by the staffs of many gas boards who have painting problems to solve, mainly on the appliance renovation side.

Among the equipment at Mitcham are a Bratt Colbran adjustable gas-fired infra-red oven, incorporating 24 industrial-type emitter panels in two banks of 12 and a Matthew Hall gas-fired infra-red tunnel and a Ballard hot air oven; a gas-heated temperature-controlled metal pre-treatment bath is installed and, finally, a variable speed conveyor system enables flow production schedules to be worked out on behalf of customers. Ample evidence exists that the Company will continue to offer an extensive service to industry from all their branches, including expert technical advice upon the choice and application of all their finishes, the preparation of colour schemes for offices, showrooms, demonstration theatres, etc. It is their constant endeavour to extend this means of service in these days of high competition and specialization.

A question which is often asked is, 'Whence comes the name "Foochow"?' It is understood that this trade name, which is attached to all the first quality products of the Company, was chosen by Mr. Donald Macpherson at the beginning of his career for reference to a new quick-drying enamel he had recently evolved. The fact that his brother was at that time captain of a tea clipper plying between Foochow and Tilbury Docks possibly struck a topical note, and was intended to engender the assumption that Chinese lacquer of fabulous durability was contained in his enamel.



Experimental and demonstration shop at Mitcham factory.

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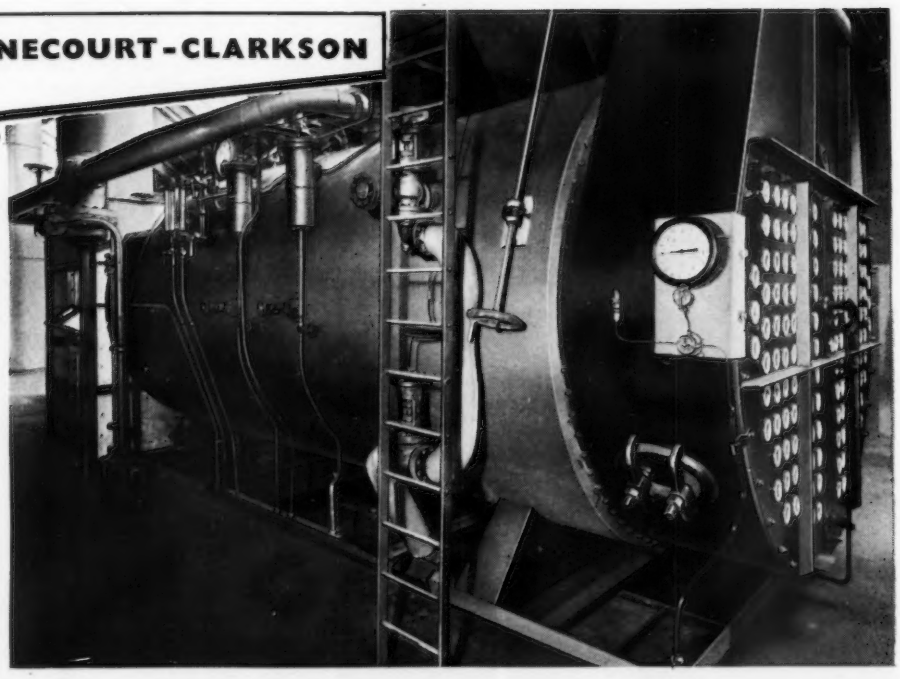

The illustration shows one of the Spencer-Bonecourt waste-heat boilers at Stoke-on-Trent Gas Works. Similar units are installed on all the Glover-West Continuous Vertical carbonising plant in this works.

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Fifth World Power Conference, Vienna, 1956

Arrangements have been made by the British National Committee for the preparation of the following papers for presentation at the Fifth World Power Conference to be held in Vienna from June 16 to 23, 1956:

SECTION A: STATEMENT AND STATISTICAL REVIEW OF DEVELOPMENTS SINCE 1950.

'Energy Resources of the United Kingdom and Trends in their Utilization', Chief Scientist's Division, Ministry of Fuel and Power.

'Oil as a Factor in Future Energy Supplies', O. F. Thompson, O.B.E., Trade Relations Department, Shell Petroleum Co., Ltd.

'The Middle East as a Factor in the Pattern of Oil Supply', P. T. Cox, M.B.E., Exploration Manager, British Petroleum Co., Ltd.

SECTION B: REPORTS ON THE METHODS OF COMPILATION AND USE OF STATISTICS.

'International Power Statistics', G. H. Daniel, D.PHIL., Chief Statistician, Ministry of Fuel and Power.

SECTION C: PREPARATION AND CONVERSION OF SOLID FUELS.

'Recent Research and Developments in Great Britain in the Thermal Treatment of Coal', W. Idris Jones, C.B.E.

'Experiences in Pulverizing Coal', R. L. Brown, M.A., Director of Research Laboratory, The British Coal Utilization Research Association and T. F. Hurley, O.B.E., Chief Research Engineer, Fuel Research Station.

'Coal Carbonization in Continuous Vertical Retorts', Dr. J. Burns, G.M., Chief Engineer, North Thames Gas Board.

'Trends in Carbonization Practice and Research in Great Britain with Special Reference to Coke Oven Plant', by G. W. Lee, M.SC., Director, British Coke Research Association and J. P. Graham, B.SC., British Coke Research Association.

SECTION D: PREPARATION AND TREATMENT OF LIQUID FUELS.

'Trends in Oil Refining Techniques', D. A. C. Dewdney, B.SC., Assistant Manager, Esso Refinery, Fawley.

SECTION E: PREPARATION AND TREATMENT OF GASEOUS FUELS.

'Developments in the Gasification of Solid Fuels in Great Britain', F. J. Dent, D.SC., Director, Birmingham Research Station.

'Petroleum Products as Raw Materials in the Manufacture of Town Gas in Great Britain', J. E. Davis, O.B.E., Chief Technical Officer, South Eastern Gas Board.

SECTION F: ECONOMIC REQUIREMENTS FOR THE ESTABLISHMENT AND OPERATION OF LONG-DISTANCE GAS SUPPLY SYSTEMS.

'Long Distance Gas Transmission—Economic and Technical Considerations', E. M. Edwards and W. T. Hird, Wales Gas Board.

SECTION G: THERMAL POWER STATIONS.

'British Power Station Design', F. H. S. Brown, B.SC., and D. Clark, B.SC.(ENG.), Chief Engineer's Department, Central Electricity Authority.

'Work of the Boiler Availability Committee since the Fuel Economy Conference of the World Power Conference held at the Hague in 1947', H. E. Crossley, PH.D., Scientific Adviser, Generation Operation Branch, Central Electricity Authority (paper written for The Boiler Availability Committee).

'Progress in the Design of Steam Turbines for Large Outputs', P. D. Morris, M.I.MECH.E., Steam Turbine Engineering Department, British Thomson-Houston Co., Ltd.

'Research in Great Britain on Fuel Cells', J. S. Forrest, M.A., Central Electricity Authority and F. T. Bacon, M.A., Department of Chemical Engineering, Cambridge University.

'The Heat Pump in Great Britain', Miss M. V. Griffith, B.SC., Head of the Heating Section, Electrical Research Association and John A. Summer, M.I.E.E.,

'Gas Turbine Developments in Aeronautics', Dr. A. W. Morley, B.SC., D. Napier and Son, Limited.

SECTION H: HYDRO-ELECTRIC POWER PLANT, INCLUDING TIDAL-POWER PLANT.

'Developments in Large Plant for Hydro-Electric Power Generation', M. Braikevitch, A.C.G.I., English Electric Co., Ltd.

'The Economics and Practical Application of Pumped Storage', T. Lawrie, C.B.E., General Manager, North of Scotland Hydro-Electric Board, T. G. N. Haldane, M.A. (CANTAB.), Partner in Merz and McLellan, and R. W. Mountain, B.SC. (ENG.), Partner in Kennedy & Donkin.

SECTION J: ATOMIC ENERGY

'Methods of Using and Processing Nuclear Fuels in a Nuclear Power Programme, including a Study of Recycling Procedures', J. V. Dunworth, C.B.E., Head of the Reactor Physics Division, Atomic Energy Research Establishment, United Kingdom Atomic Energy Authority.

'Technical Problems of Designing and Operating Reactors for Producing Electrical Power and the Problems of Making them Economic', H. H. Gott, M.A., Atomic Energy Industrial Group.

'Nuclear Generation and the Future Power System in Great Britain', J. C. Duckworth, B.A., P. J. Squire, B.SC., and V. G. Newman, B.SC. (ENG.), Chief Engineer's Department, Central Electricity Authority.

SECTIONS L. AND M: 'PURIFICATION OF WASTE WATERS' AND 'PURIFICATION OF WASTE GASES'.

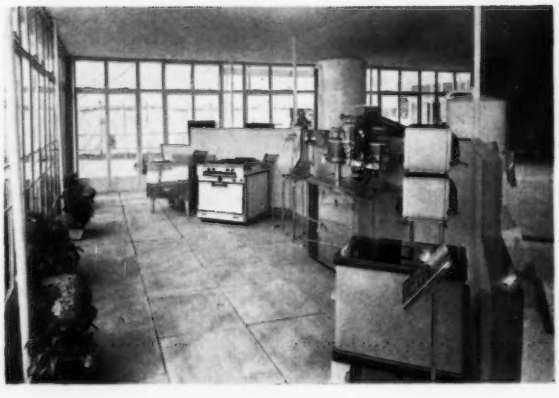
'Waste Waters from the Production and Utilization of Fuels—their Nature, Treatment and Disposal', Professor A. L. Roberts, PH.D., and W. H. Blackburn, M.SC., Leeds University.

'Air Pollution and Waste Gases from the Preparation and Utilization of Fuels', A. Parker, C.B.E., Director of Fuel Research.

'The Disposal of Waste Waters and Gases in a Nuclear Power Programme', D. R. R. Fair, O.B.E., A. S. McLean, M.B., and H. J. Dunster, A.R.C.S., United Kingdom Atomic Energy Authority.

ROYAL WELSH SHOW

The Gas Council, in conjunction with the Wales Gas Board, again put up an excellent display for gas at the premier agricultural show for Wales—the Royal Welsh, held this year at Haverfordwest. These pictures of the exterior (stressing the many uses of gas and coke on the farm and in the home) and a section of the interior (equipped with 'live' exhibits) speak for themselves.



NEW GLASGOW DIVISIONAL HEADQUARTERS

The Glasgow Division of the Scottish Gas Board which, since vesting date, has remained in the City Chambers, where the former Glasgow Corporation Gas Department was housed, has now moved into its new headquarters in a seven-storey building at 9, George Square, Glasgow. The 500 employees are installed in five of the seven floors and the basement, which have undergone extensive alterations and additions since the former proprietors moved out, in congenial working conditions.

Showpiece

The showpiece of the new quarters as far as the public is concerned is on the ground floor. Entering the building from either George Square or Hanover Street one finds a bright, airy, and high-ceilinged reception hall equipped with two lengthy counters. At the longer a staff awaits enquiries and/or complaints; at the other there are new facilities for paying accounts. Two lifts, one reserved for staff, serve the building.

The chief weight of business conducted in the new building is the direct day-to-day work with the domestic consumers in the Glasgow District. There is also, however, the wider sphere of final accounting for all districts in the division. In the Glasgow District there are 166,000 consumers with ordinary meters and 199,000 with prepayment meters. The figure for all other districts is about 28,000, making a total of 393,000 in the Glasgow Division. The Glasgow District employs about 133 meter readers and collectors, and with these the total number of employees at the new office is round about 500.

A National Influence

In one respect the division exerts a national influence. In the basement, space has been reserved for demonstrating industrial and commercial equipment, and there is also a drawing office, and a laboratory for experimental and research work. This department was previously located at the central showrooms in Sauchiehall Street, but accommodation there has been inadequate for some time. The department has been expanding rapidly and now gives advice to industrial consumers in all parts of Scotland.

A large part of the space on the ground floor has been set aside for a showroom for the exhibition and demonstration of cookers, fires, refrigerators, washing machines, heaters, and other appliances. This will meet a long-felt need for a showroom at the main office. The new showroom, which will not be fully equipped for two months yet, will be in addition to the four others in the district.

Sales and Service

The sales and service superintendent will also have his office on the ground floor. The main finance department, dealing with divisional accounts, wages, and a considerable hire purchase business, is on the first floor. Hire purchase is a comparatively new development which has grown in volume since vesting date. At present the Board has between 60,000 and 70,000 hire purchase agreements in Scotland.

This business has been affected by the restrictions imposed by the Chancellor of the Exchequer, but it has been supplemented by a system of simple hire which the Board has introduced. Nevertheless, the volume of hire purchase business reflects the continued popularity of gas as a domestic fuel. The volume of gas supplies during the recent hot weather indicated that increasing use is being made of heaters and circulators to meet the hot water requirements of the household at a time when coal fires are not required.

The second and third floors are occupied by the meter and rental survey departments, who keep the records of all gas consumers in the Glasgow District. From them all information about gas charges, hire purchase agreements, and appliances fitted can be obtained immediately.

The administration and chief clerk's offices are on the fourth floor, and on the seventh are the engineering and chemical works offices and the medical officer's rooms. The medical officer has been appointed for the whole of Scotland. In addition to the board room, where liaison meetings with board members from Edinburgh are held, there is a conference room for meetings of the joint consultative councils of manual works and office staffs. They meet quarterly to discuss matters relating to efficiency, health, safety, and welfare with management representatives.

One wall in the accounts department is entirely devoted to banks of little index drawers which contain the names and addresses of every consumer in the Glasgow District. These number some 365,000. The preparation, folding, and addressing of accounts is completely mechanized.

Press Publicity

The occasion of the removal to the new headquarters was marked by an excellent two-page spread editorial and advertising feature in the *Glasgow Herald* of August 3. The Gas Board's own displayed advertisement was well supported by those of many of the leading industrial and domestic appliance manufacturers and of other firms who had a share in the modernization and equipment of the George Square premises. The text described the progressive expansion of industrial gas utilization in Scotland, the work of the commercial development section, the facilities for domestic consumers, and the benefits of concentration in the large and modernized offices. The Glasgow *Evening News* and the *Evening Citizen* also carried similar features.

SHEFFIELD STREET LIGHTING

Sheffield has 11,885 public gas lamps against 12,160 last year, and 17,685 electric lamps against 16,626. In the financial year ended March 31 the city's street lighting cost 81.11d. per head of the population, or, in terms of rates, 11.9d. in the pound, compared with 46.8d. per head or a rate of 7.72d. in the pound, in 1949.

Labour Shortage

Mr. C. J. Chisholm, City Lighting Engineer, in his annual report, refers to a serious shortage of labour, which affected the cleaning and maintenance of lamps and the usual nightly inspection. This caused some anxiety and in an effort to relieve that anxiety women lamp attendants were engaged. They carried out their duties extremely well, but Mr. Chisholm is 'not happy about the labour situation.'

Street lighting equipment continued to receive considerable malicious damage, and while Mr. Chisholm notes a reduction in the number of gas lamps so damaged, he reports an increase as far as electric lamps were concerned. There were 4,913 panes of glass in gas lamps, and 3,831 electric lamps broken, while 121 electric lamps were removed by persons unknown. This wilful and wanton damage is giving much concern, and is usually done when no one is about, so that it is almost impossible to catch the culprits. The Department received every assistance in this matter from the Police and Education Department, and thanks are expressed to the Chief Constable and his officers, the Director of Education and his staff, and to members of the public for their help in safeguarding public property.

The number of lamps accidentally damaged showed an increase of 12 on that of last year. Damage occurred to 355 street lamps during the year. The cost of repairing the damage amounted to £2,612 of which £2,162 was recovered for the repair of 255 lamps. The balance of £450 was irrecoverable, as it was not possible to trace the persons responsible for the damage to 100 lamps. Of the 726 miles of streets at March 31, 397 were lighted by gas and 312 by electricity.

New Lamps Installed

Thirty-four new gas lamps were installed, but the number of new electric installations considerably outweighed the increase, and there were many conversions. Gas consumption, at 199 mill. cu.ft., showed an increase of 4,188,493 cu.ft. over the previous year (the consumption per lamp being increased in many instances in connection with improved lighting). Electricity consumption was 8,659,832 units, an increase of 490,788 units. Gas mantles used during the year numbered 53,127, an average of 1.84 per nozzle per annum.

Gas for Ashington

A supply of gas has been taken to the mining town of Ashington (Northumberland) which for more than 40 years has been served only by electricity. The area was at one time supplied with gas by the local colliery company, but this ceased 43 years ago. The Northern Gas Board (Blyth Division) has laid a main to the Beamsley Terrace housing site and the supply was officially inaugurated by officials of the Board and local councillors, having tea prepared on the town's first main-supplied gas cooker.

It is expected that the supply of gas will be gradually extended throughout the town. The Gas Board is to close down the gasworks at the nearby town of Newbiggin and the area will afterwards be supplied by a new gas main from Blyth.

House Modernization

Five Cardiff houses which have been modernized by the Cardiff City Council to demonstrate to house owners how they can introduce new amenities with the help of local authority grants were opened by Mr. William Deedes, Parliamentary Secretary to the Ministry of Housing and Local Government, on July 27.

The five houses in Railway Street (a sixth was left in its original condition for comparison) are over 60 years old; they have now been given piped hot water supplies, modern bathrooms, modern grates, larders, sink units, and linen stores. The cost of improvement for each house varied from £235 to £502, of which the grant would have paid for half in each case had the house been privately owned.

More than 1,100 local housing authorities in England and Wales have made grants towards the modernization of old houses.

Wales Gas Board Scholarship

The Bakery, Confectionery, and Catering Department of the Cardiff Technical College enjoys an international reputation in the baking world. Students from many parts of the world attend the courses, and every premier award in the baking industry has been won at one time or another by students from this college. A large proportion of the equipment which is used for training purposes is gas-fired, and the closest of co-operation exists between the college authorities and the Cardiff undertaking of the Wales Gas Board.

On a number of occasions students have carried out practical demonstrations of their art in the various showrooms of the Wales Gas Board, and the Board recently donated an annual scholarship of 25 guineas for open competition among first year students at the college. The scholarship is known as the Wales Gas Board-Cardiff Undertaking scholarship, and the education authorities in the city have expressed their pleasure at the interest which the undertaking is showing in the work of the college.

GAS SUPPLIES FOR LEICESTERSHIRE

Following the recent change at Loughborough, more Leicestershire gasworks are to close as producing plants. Wigston has just closed, but the dates for Market Harborough and Kibworth have not yet been fixed.

Market Harborough and Kibworth will join other parts of Leicestershire in drawing gas from the recently laid main which will carry supplies from the large producing plant at Derby and from coke ovens in the Chesterfield area and also along the route of the new main. Gasholders will remain, but many of the buildings and much of the plant at Market Harborough will disappear.

The Harborough gasworks was built in the 19th century and was run by two companies before 1899, when it was acquired by the local urban council. It was operated by father and son, Mr. A. Harris and Mr. P. Harris, Managers, prior to nationalisation.

The majority of the 48 men employed at Kibworth and Harborough are unaffected by the close-down. Some have reached retiring age and of the others many will be offered alternative employment. By the end of 1955 Leicester (Aylestone Road) and Northampton will be the only Leicester and Northants district works producing gas.

Clean Air Bill Welcomed

At a meeting on July 28 of the Executive Council of the National Smoke Abatement Society, the following resolution was adopted: 'This meeting of the Executive Council of the National Smoke Abatement Society welcomes the publication of the Clean Air Bill and expresses its appreciation to the Government for having prepared so speedily such a comprehensive measure. Without necessarily endorsing all its details, to which further study is being given, the Council regards the Bill as a very considerable advance on, and consolidation of, existing legislation. It recognizes that the successful implementation of its provisions will depend largely on the manner in which they are operated by the local authorities and the Government Departments and urges them to prepare at once to use them to the full.

NEW TOWN'S 3,000th HOUSE

At the opening of the 3,000th house. Left to right are Sir Patrick Dollan, Sir Garnet Wilson, Mr. Neil Anderson, and Major-General Reginald Dixon.

The 3,000th house in the new town at East Kilbride, Lanarkshire, was formally opened by Sir Garnet Wilson, Chairman of Glen Rothes Corporation. Sir Patrick Dollan, Chairman, and Major General Dixon, General Manager of the East Kilbride Development Corporation, were also present. The house was one of three old folk's houses and was allocated to Mr. and Mrs. Neil Anderson. The house was designed by East Kilbride Development Corporation and comprised living room, bedroom, kitchen, and bathroom. The new town of East Kilbride is maintaining its planned rate of development of 1,000 houses per annum, and the present population is in the region of 12,000.

A gas boiler, a poker point in the living room, and either a gas fire in a bedroom or an Ascot jigged wall fitting are provided in each house, which is also serviced for either a gas or electric cooker.

All the tenants are allowed to choose the type of cooker they prefer, and to date, approximately 80% of them have chosen gas.

NEWS IN BRIEF

Mr. W. O. Kirkwood, General Manager of the Sunderland Division of the Northern Gas Board, presented diplomas to 27 drivers for safe driving during 1954, at a ceremony in the divisional offices on July 19. Mr. Kirkwood, congratulating the drivers, said 95% came through 1954 with a clean record.

The Dry Spell was responsible for the loss of about 100,000 cu.ft. of gas from a gasholder at Lochee, Dundee. One of the water seals containing the gas evaporated, and Dundee Fire Brigade was called to refill it with hoses. A Scottish Gas Board official said normal rainfall was usually all that was required to keep the water seals supplied, and it was very rare for such a mishap to occur. Gas supplies in the area were unaffected.

Thirty Employees of the West Midlands Gas Board were presented at Wolverhampton on July 29 with long-service awards, by Mr. W. R. Branson, M.SC., Deputy Chairman of the Board. Eight of them had served 40 years and the remainder 25 years in the gas industry. Three other employees who have served 50 years will receive awards and certificates at Christmas at a special presentation by the Chairman of the Board. The total number of years of service by recipients was 1,020 years.

Bangor Borough Council was informed by Mr. J. A. Derbyshire, Gasworks Manager, that recent increases in the price of coal and freight would probably mean an increase of a shilling per 1,000 cu.ft. for gas in the town. The average increase in the price of coal, he pointed out, was 13s. per ton. In the remaining nine months of the financial year Bangor gas undertaking would use 12,000 tons of coal, and the increase would cost them £7,800. Since May last, freight charges had risen twice, and all these increases meant that the undertaking would have to find £13,000 between now and the end of next March.

Long Service Awards.—Twenty-one employees who have been closely connected with the manufacture of Cannon gas appliances for a total of 1,099 years received long service awards at the Bilston factory recently. Making the presentations Mr. A. F. Oatley, Chairman and Managing Director, commented, 'Long service seems to be a relic of the past. It is a pity'. The skill that derives from a sound training in apprenticeship and the experience that comes only with long years 'on the job' make a major contribution to the maintainance of high quality in any products. Outstanding quality is the hallmark of Cannon appliances—a hallmark of which the Company is proud, and which it is determined to maintain.

Stotts of Oldham, the kitchen-planners and catering equipment manufacturers, have issued a booklet on large scale kitchens and their planning. The booklet gives the basic information required to plan a large kitchen. Free copies may be obtained from James Stott & Co. (Engineers), Ltd., Poland House, 167, Oxford Street, London, W.1.

Edinburgh Town Council has decided that on a change of tenancy in a house where the Corporation has installed gas cookers and boilers these fittings should be removed before the new tenant moves in. The decision, taken as a matter of economy, was described by one Councillor as 'niggardly, nibbling, and paltry pinching.'

A Technical Training School is to be established in England by the Minneapolis-Honeywell Regulator Co. to groom engineers and other technical personnel in the use of automatic control equipment which is used broadly in the United States. Classes for the first year will comprise Minneapolis-Honeywell personnel from Great Britain, Holland, Switzerland, Sweden, Belgium, and Germany. Later plans call for customer students from Great Britain and Western European industrial firms to attend the school. The industrial control devices to be studied at the school cover a wide variety of automatic recording, measuring, and controlling instruments which are typical of the automation pattern that is growing rapidly in industry. The new training school, to be established in Perivale, Middlesex, will be a one-storey building with fully equipped classrooms and laboratories. Its director will be Mr. Harry Horton, a member of Honeywell-Brown, Ltd., the firm's subsidiary in Great Britain.

After an Interval of 15 years, the registered office of the Mond Nickel Co., Ltd., is again Thames House, Millbank, S.W.1. Early in the war the Company's head office staff were dispersed to various locations in the provinces and suburbs; later they removed to Grosvenor House, London, and subsequently to Sunderland House, Curzon Street, which was the registered office until the latest move.

Contracts for Extension to Britain's atomic power supply system amounting to several million pounds have been placed with Babcock & Wilcox, Ltd., who supplied the steam plant for the original station at Calder Hall. The new contracts cover what is in effect three new Calder Halls. Eight steam towers each 80 ft. in height, will be supplied to a new station to be known as Calder Hall 'B'. Two further installations, totalling 16 towers, will be supplied to a power station at Chapelcross near Annam in Dumfriesshire.

Glasgow is likely to be one of the first large centres to take advantage of the Government's new legislation on smoke control areas. More than two years ago the Corporation approved in principle the establishment of a smokeless zone in the central area of the city, and since then a survey of the area has been completed. But for the new Clean Air Bill the Corporation would have required to seek powers through a Provisional Order and this might have caused delay. The survey has shown that in the area selected for the zone there are only 280 domestic dwellings. Once the smokeless zone is established, and results seen, it is planned to extend the principle to other parts of the city.

Company News

MIDLAND BRASS FITTINGS

At the annual general meeting of Midland Brass Fittings Co., Ltd., held in Birmingham in July, Mr. G. K. March, presenting his report, pointed out that although sales continued high, profit tended to be in inverse ratio by reason of exceptional competition now experienced in the Company's field of operations. It was agreed that the bonus to employees should remain unchanged and the report and balance sheet was unanimously adopted.

UNITED GAS INDUSTRIES

A final dividend of 9¼% on ordinary shares is announced by United Gas Industries, Ltd., which together with an interim dividend of 3¼% makes 13% for the year ended March 31, 1955. The dividend on the 1s. deferred share is 10½d. per share or 85 5/12 %. The net profit of the group was increased from £330,480 to £544,928. After providing for depreciation of fixed assets and crediting income from investments the available profits for the year after taxation was £205,122 compared with £94,329 for the previous year. In a statement issued by the Chairman, Lieut.-Col. W. C. Smith, with the report and accounts it is noted that the bank overdraft of the group had increased from £265,836 to £440,046 during the year. Colonel Smith said that it was therefore important that the group should continue to retain within the business a reasonable proportion of each year's profits. He said that the reimposition of hire purchase restrictions had adversely affected the business in gas cookers and water heaters in common with other manufacturers and it had been necessary to curtail the production of these items.

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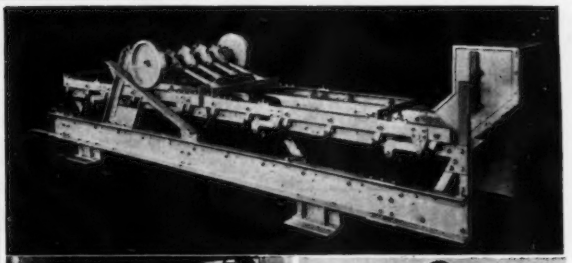

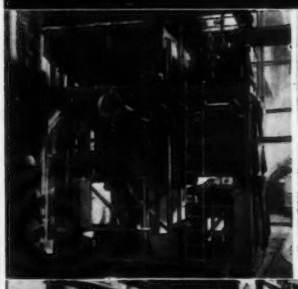

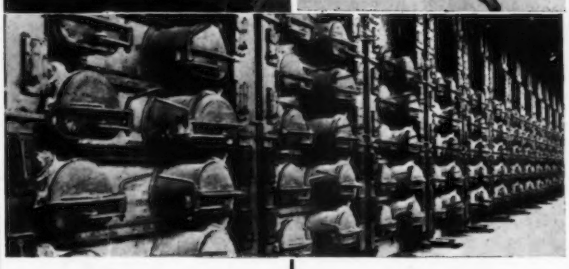

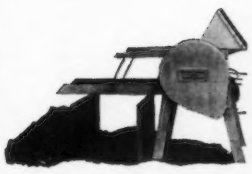

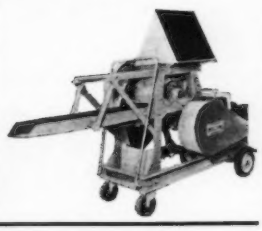

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J. BROWN & CO. LTD.
SAVILE TOWN, DEWSBURY, YORKS.
Supply:–
"BROWNOX-de-LUXE" PURIFYING MATERIAL
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Driving and Conveyor Chains of the best quality; made of Ley's Celebrated Blackheart Malleable Iron.
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10" & 12" New Cast Iron Flanged Pipes 9' & 12'
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VALVES for GAS, WATER, & STEAM
Sizes ¼" to 36" in C.I. Gun Metal & Steel.
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All sizes up to 24" Flanged, Plain ends, Screwed & Socketed, Loose Flanged, Victaulic & Unicone Joints.
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IRON CEMENT
ONE OF THE FIRST AND
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W. T. HAWKINS & CO.
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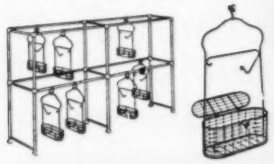
THESE AIR DRY "SIEBER" HANGERS ARE A TREAT

"At last I can change into dry uncreased clothing when I go home! It's plain common-sense to hang rain-soaked 'togs' on a **SIEBER** Hanger instead of bundling them into an unventilated, smelly locker. It saved me from many colds and my clothes are fresh and wear better. The boss, too, must like these **SIEBER** Hangers because they reduce absenteeism and the space he saves is bound to repay the little money they cost. Repair costs? Not on your life, because this Hanger Equipment is made to last for good and all."



Locking Basket and other types of Hanger to suit individual requirements, fully meeting the New Factory Act.

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ALL-IN-ONE HANGER EQUIPMENT
Permanent Exhibit at Health & Safety Centre, London, S.W.1.
Installed in Factories, Offices, Public Undertakings, Schools, Hospitals, etc.
Write today for full details of our Free Planning Service.
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WESTWOOD & WRIGHTS
LIMITED
BRIERLEY HILL, STAFFS.
GASHOLDERS · PURIFIERS · WASHERS
CONDENSERS · CASTINGS · STEELWORK
GAS VALVES · WELDED PIPES

PUBLISHERS' NOTICE

The " Gas Journal " is published every Wednesday, price 1/3d.; by post 1/5d.

Subscription Rates: Home and Empire:—52/- per annum; Foreign:—60/- per annum. (Both payable in advance.) A copy of the " Gas Journal " Calendar & Directory is presented each year to continuous subscribers.

Classified Advertisements: All small classified advertisements are charged at 2/- per line (approx. 7 words)—minimum charge 10/-. A Box Number address occupies 2 lines, and a further 6d. is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

Displayed Advertisements: Rates obtainable on application to the Business Manager. Change of copy for displayed spaces must be received 14 days prior to publication if proofs are required. Type area of inside pages 10 in. deep × 7 in. wide; block screen 120.

BUSINESS MANAGER: S. T. CULLEN

MIDLANDS MANAGER: G. B. Torrance, 42, Wychall Lane, King's Norton, Birmingham, 30. *Telephone:* Kings Norton 3868

NORTHERN MANAGER: Philip W. B. King, Flat 1, 7 Langcliffe Avenue, Harrogate. *Telephone:* Harrogate 67625.

SOUTHERN REPRESENTATIVE: A. Engelhardt, 11, Bolt Court, Fleet Street, E.C.4. *Telephone:* Fleet Street 2236-7

WALTER KING, LTD., 11, Bolt Court, Fleet Street, London, E.C.4.

Telephone: FLEet Street 2236-7. *Telegrams:* Gasking, Fleet, London.

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DUTCH AND DANISH BOG ORE SPECIALLY ACTIVATED OXIDE OF IRON

Oxide supplied on loan or sale outright.

Highest prices paid for Spent Oxide

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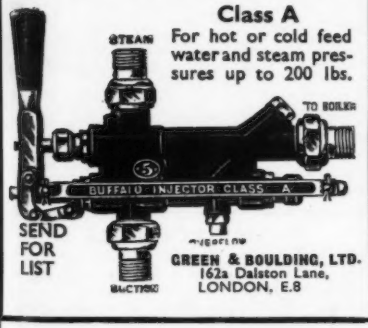
Telegrams: "Purification, Stock, London." Telephone: London Wall 7938/9 & 7930

BUFFALO INJECTORS

Class A

For hot or cold feed water and steam pressures up to 200 lbs.



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For resale to the public, and in bulk for works use.

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KINGS PATENT AGENCY, LTD

(Director, B. T. King, A.I.M.E., Patent Agent) Advice, Handbook, and Consultations free. 146a, Queen Victoria Street, London, E.C.4. 'Phone: City 6161.

APPOINTMENTS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive or a woman aged 18-59 inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order, 1952.

WASHING MACHINE ADVISER required for demonstrating the Parkinson " Live Water " washing machine at Exhibitions and to personnel of the Gas Industry. The work is interesting and varied.

Preference will be given to ladies already trained in similar work, but specialised training will be provided. A good standard of education is essential, together with pleasing manner and speech.

The selected candidate will be required to travel extensively and to be a resident of the Birmingham area. Generous salary and permanent position.

Apply to Personnel Manager, Parkinson Stove Co., Ltd., Iron Lane, Stechford, Birmingham, 33.

NORTHERN GAS BOARD
(TYNESIDE DIVISION)
INDUSTRIAL SALES

APPLICATIONS are invited for the position of INDUSTRIAL GAS SALES MANAGER to the Tyneside Division of the Northern Gas Board.

Applicants should have a wide knowledge of Industrial Heating processes, and experience in heavy industry would be advantageous.

The salary will be £1,100 per annum.

The successful applicant will be required to pass a medical examination, and to join the Board's Pension Scheme.

Applications stating age, fullest details of experience and technical qualifications, should be addressed to the undersigned, not later than August 27, 1955.

W. SUTCLIFFE,
Divisional General Manager.

30, Grainger Street,
Newcastle-upon-Tyne, 1.

NORTHERN GAS BOARD
(TYNESIDE DIVISION)

APPLICATIONS are invited for the post of SENIOR CHEMIST at the Howdon Works of the above Division.

Candidates should be suitably qualified to undertake full responsibility, under the Works Manager, for supervision of chemical staff, and for all chemical testing and control of modern carbonising plant and ancillary equipment on a large Works.

The appointment will be within Grade A.P.T. 9 (£700-£800 per annum) of the National Salary Scales for Gas Staffs.

The successful candidate will be required to pass a medical examination and be subject to the Board's Pension Scheme.

Applications, stating age, experience, qualifications and giving names of two referees should be addressed to the undersigned within fourteen days of this advertisement.

W. SUTCLIFFE,
Divisional General Manager.

30, Grainger Street,
Newcastle-upon-Tyne, 1.

CLERK (Male, age 23-45) required by large firm of Engineering Contractors. Quick at figures, good handwriting. Engineering experience advantage but not essential. Commencing salary £500 per annum. Five day week; Canteen. Apply in writing, stating age, education and full particulars of experience to the Personnel Officer, Woodall-Duckham Construction Company, Ltd., 63/77, Brompton Road, London, S.W.3.

EASTERN GAS BOARD
(TOTTENHAM DIVISION)
DEPUTY INDUSTRIAL SALES MANAGER

APPLICATIONS are invited from suitably qualified persons for the appointment of DEPUTY INDUSTRIAL SALES MANAGER.

Applicants should be Corporate Members of the Institution of Gas Engineers or possess other acceptable qualification. They should be used to dealing with all classes of industrialists and capable of assessing and exploiting opportunities for the application of gas to industrial processes, preparing quotations for gas installations and appliances, negotiating and completing sales and supervising installation work.

It is highly desirable that the applicants are experienced in the design of special industrial gas apparatus and central heating installations.

The duties will include, from time to time, the supervision of the technical, clerical and manual staffs.

The commencing salary will not be less than £1,000 per annum.

The successful candidate may be required to pass a medical examination and, unless already subject to a Pension Scheme by virtue of the Gas (Pension Rights) Regulations, 1950, will be required, if eligible, to join the Board's Staff Pension Scheme within six months from taking up the appointment.

Applications, stating age, qualifications and experience, should reach the Divisional Personnel Manager, Woodall House, 658, Lordship Lane, Wood Green, N.22, not later than September 16, 1955.

EASTERN GAS BOARD
WATFORD DIVISION
APPOINTMENT OF INDUSTRIAL REPRESENTATIVES AND COMMERCIAL REPRESENTATIVES

APPLICATIONS are invited from those interested in the above appointments, of which there are a number to be made in the Southern and the Northern Sections of the Division.

Industrial Representatives will be required to advise and assist Industrial consumers using gas in a wide variety of applications and to use all their efforts to expand gas sales. Commercial Representatives will be expected to carry out similar duties in connection with commercial usage.

All applicants should possess the qualifications and experience to prepare schemes and estimates and conduct business with representatives of industry and commerce, Architects and Surveyors.

In special cases training will be given to employees who possess some but not all of the qualities necessary for these appointments. The commencing salaries for trained personnel will be as follows:—

Industrial Representatives—in the range APT. 8 and 9 (£680/£820 per annum, Fringe Metropolitan).

Commercial Representatives—in the range APT. 7 and 8 (£640/£760 per annum, Fringe Metropolitan).

The successful candidates may be required to pass a medical examination and, unless already subject to a Pension Scheme by virtue of the Gas (Pension Rights) Regulations, 1950, will be required, if eligible, to join the Board's Staff Pension Scheme within six months of taking up the appointment.

Applications giving full details of education, training and experience should be forwarded to the General Manager, Eastern Gas Board (Watford Division), Radiant House, Clarendon Road, Watford, to arrive not later than September 3, 1955.

(*Classified advertisements continued on page* 474)

APPOINTMENTS VACANT (ctd.)

EAST MIDLANDS GAS BOARD

LINCOLNSHIRE DIVISION
TECHNICAL ASSISTANT (PRODUCTION)—SCUNTHORPE GROUP

APPLICATIONS are invited from suitably qualified persons for the position of GROUP TECHNICAL ASSISTANT (Production) at Scunthorpe at a commencing salary within A.P.T. Grade 6 (£565/£645) according to age, qualifications and experience.

Applicants should be in possession of the Institution of Gas Engineers' Higher Grade Certificate in Gas Manufacture or equivalent qualifications and they should be experienced in the operation of modern machine charged Horizontal Retorts.

The post is superannuable and the successful applicant will be required to pass a medical examination. He will also be required to join the Board's Staff Pension Scheme.

Applications, giving details of education, training and experience, together with the names and addresses of two referees, should be addressed to reach the undersigned not later than September 3, 1955.

BERNARD CLARKE,
Divisional General Manager.

Belle Vue House,
Carline Road,
Lincoln.
August 12, 1955.

EAST MIDLANDS GAS BOARD

SHEFFIELD AND ROTHERHAM DIVISION
SENIOR CHEMIST, CAR HOUSE WORKS

APPLICATIONS are invited from suitably qualified persons for the position of Senior Chemist, Car House Works, Rotherham, at a salary in accordance with grade APT. 9/10 (£700/£860) of the National Salary Scales. The initial placing on the scales will be dependent upon qualifications and experience.

Candidates should have had experience in coal carbonisation and the operation of by-product plant. The person appointed will be responsible under the Works Engineer for the supervision of the laboratory staff and the chemical control of the by-product plant.

The post is pensionable and the successful applicant will be required to pass a medical examination.

Applications, giving details of age, education, training, qualifications, etc., and giving the names and addresses of two referees, should be addressed to reach the undersigned not later than August 31, 1955.

C. C. WOOD,
Divisional General Manager.

Gas Offices,
Commercial Street,
Sheffield, 1.
August 8, 1955.

EAST MIDLANDS GAS BOARD

SHEFFIELD AND ROTHERHAM DIVISION
APPOINTMENT OF ELECTRICAL FOREMAN FOR CAR HOUSE GAS WORKS, ROTHERHAM

APPLICATIONS are invited for the position of ELECTRICAL FOREMAN at the new Gas Works at present in an advanced stage of construction at Car House, Rotherham.

Applicants should be qualified and preferably have had experience in the operation and maintenance of electrical equipment in gasworks, including turbo alternators and transformers of 1,000 kVA capacity and control gear for motors up to 500 h.p.

They should also be conversant with Electrical Regulations and be capable of controlling electrical maintenance staff.

The salary will be in accordance with A.P.T. 6(a) of the National Salary Scales for Gas Staffs (£590 to £670 per annum).

The post is pensionable and the successful applicant will be required to pass a medical examination.

Applications giving details of age, training, qualifications, etc., together with the names and addresses of two referees should be addressed to reach the undersigned not later than August 31, 1955.

C. C. WOOD,
Divisional General Manager.

CCW/EMM/PER.
Gas Offices,
Commercial Street,
Sheffield, 1.
August 5, 1955.

NORTH THAMES GAS BOARD

THE following SENIOR DRAUGHTSMEN are required in the CHIEF ENGINEER'S Drawing Office at WESTMINSTER, S.W.1:—

(i) For the design and layout of general process plant and all associated structural steelwork.

(ii) For the design of materials handling plant and the detailing of associated steelwork.

Candidates should preferably be corporate Members of the Institutions of Civil, Structural or Mechanical Engineers. Starting salaries within the range £790 to £940 per annum, according to age, qualifications and experience. The successful candidates will be required to join the Staff Pension Scheme.

Applications, giving age and full particulars, should be sent to the Staff Controller, North Thames Gas Board, 30, Kensington Church Street, London, W.8, quoting reference 666/191.

NORTH THAMES GAS BOARD

CHEMISTS and PHYSICISTS holding University degrees are required in the Laboratories at Watson House, Fulham, S.W.6, to undertake research work on the utilisation and design of domestic and industrial gas and coke appliances, particularly on cookers, water heaters, gas and coke fires, refrigerators and industrial apparatus.

The Laboratories have recently been modernised and extended, and are responsible for research work for the Gas Industry throughout the country.

The appointments will be permanent and pensionable, and the starting salary will be within the range £635 to £850 per annum, according to age, qualifications and experience.

Applications should be sent to the Staff Controller, North Thames Gas Board, 30, Kensington Church Street, W.8, quoting reference No. 666/280, to reach him within ten days of the appearance of this advertisement.

SCOTTISH GAS BOARD

GLASGOW DIVISION
GLASGOW DISTRICT
MECHANICAL ENGINEERING DRAUGHTSMAN

A VACANCY exists in the Engineer's Office of the Glasgow Division of the Scottish Gas Board for a MECHANICAL ENGINEERING DRAUGHTSMAN within Grade A.P.T. 5/7 (the maximum of which is £700 per annum) with placing according to qualifications and experience.

The post will be superannuable, and the successful candidate may be required to undergo medical examination.

Applications endorsed "ME/EO," stating particulars of experience, etc., should reach the undersigned on or before August 27, 1955.

D. F. YOUNG,
Divisional Controller.

9, George Square,
Glasgow, C.2.

SCOTTISH GAS BOARD

GLASGOW DIVISION
GLASGOW DISTRICT
CIVIL/STRUCTURAL ENGINEERING ASSISTANT

A VACANCY exists in the Engineer's Office of the Glasgow Division of the Scottish Gas Board for a CIVIL/STRUCTURAL ENGINEERING ASSISTANT, in Grade A.P.T. 6/8 (the maximum of which is £740 per annum), with placing according to qualifications and experience. Excellent promotional opportunities for the right person.

Applicants should be experienced in reinforced concrete design and detailing, have a knowledge of structural steel work and building construction.

The post will be superannuable, and the successful candidate may be required to undergo medical examination.

Applications endorsed "CS/EO," stating particulars of experience, etc., should reach the undersigned no later than 14 days after publication of this notice.

D. F. YOUNG,
Divisional Controller.

9, George Square,
Glasgow, C.2.

WEST MIDLANDS GAS BOARD

BIRMINGHAM AND DISTRICT DIVISION
ASSISTANT ENGINEER,
NECHELLS WORKS, BIRMINGHAM

APPLICATIONS are invited for the position of ASSISTANT ENGINEER at the Nechells Works which produces 40 million cubic feet per day, and is shortly to be augmented to 52 million. The position is interchangeable with parallel posts at other Works of the Birmingham District and transfers may be made from time to time.

The duties will entail full responsibility for the operation of large installations of carbonising and/or carburetted water gas plants under the jurisdiction of the Engineer and Works Manager and his Deputy.

Candidates should have had extensive experience in the operation of continuous vertical retorts, and automatic carburetted water gas plants, and in the control of staff and labour. Corporate Membership of the Institution of Gas Engineers is an essential qualification and the possession of an Engineering Degree or a Gas Engineering Diploma will be an advantage.

The salary will be £1,000 rising by annual increments of £50 to £1,100 per annum.

A choice of two modern flats will be available at a reasonable rent.

The post is pensionable, and the successful candidate may be required to pass a medical examination.

Applications stating age, qualifications and particulars of training and experience, together with the names of two referees, should be addressed to the Industrial Relations Officer, West Midlands Gas Board, 6, Augustus Road, Edgbaston, Birmingham 15, to reach him within fifteen days of the appearance of this advertisement.

J. C. INGRAM,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

(WARWICKSHIRE DIVISION)
RELIEF SHIFT ENGINEER—COVENTRY DISTRICT

CANDIDATES must be qualified to take complete control of the Works when normal day technical staff is absent, and the duties will include responsibility for control of holder stocks and Calorific Values.

The salary will be within Grade 7 (£620-£700 per annum) of the National Salary Scales for Gas Staffs.

The post is pensionable, and the successful candidate may be required to pass a medical examination.

Applications stating age, qualifications and experience, together with the names of two referees, should be addressed to Mr. A. Allen, Divisional General Manager, Warwickshire Division, West Midlands Gas Board, Gas Street, Coventry, to reach him within fifteen days of the appearance of this advertisement.

J. C. INGRAM,
Secretary to the Board.

WALES GAS BOARD

INDUSTRIAL RELATIONS OFFICER

APPLICATIONS are invited for the post of INDUSTRIAL RELATIONS OFFICER.

Candidates will be required to possess wide knowledge of personnel management generally, and in particular, of the principles and methods of determining salaries, wages and conditions of service of employees in a large scale organisation. Applicants should preferably also have had practical experience of staff establishment work and of the conduct of joint negotiations on an Area or National basis. Candidates should also possess experience in the application of education and training schemes.

The commencing salary will be £1,500 per annum. The post is pensionable, and the person appointed will be required to undergo a medical examination.

Applications, stating age, particulars of education, present position, qualifications and experience, with the names of two referees, should be received by the undersigned not later than September 1, 1955.

C. B. MAWER,
Secretary.

Wales Gas Board,
2, Windsor Place,
Cardiff.

SOUTH WESTERN GAS BOARD

SWINDON DIVISION
INDUSTRIAL GAS ENGINEER

A SUITABLY qualified person is required to develop industrial gas sales and to organise the installation and maintenance of all types of industrial appliances.

Applicants should have had wide experience of this work and preferably be Members or Associate Members of the Institution of Gas Engineers.

Salary within Grade A.P.T. 12 (Prov. 'A') £835-£960.

The successful candidate will be required to pass a medical examination and subject to any pension rights he may now possess, to join the Board's Staff Pension Scheme, if eligible.

Applications stating age, experience and qualifications together with the names of two referees to be forwarded to the undersigned not later than Saturday, September 3, 1955.

W. B. CLARIDGE,
Divisional Engineer and Manager.

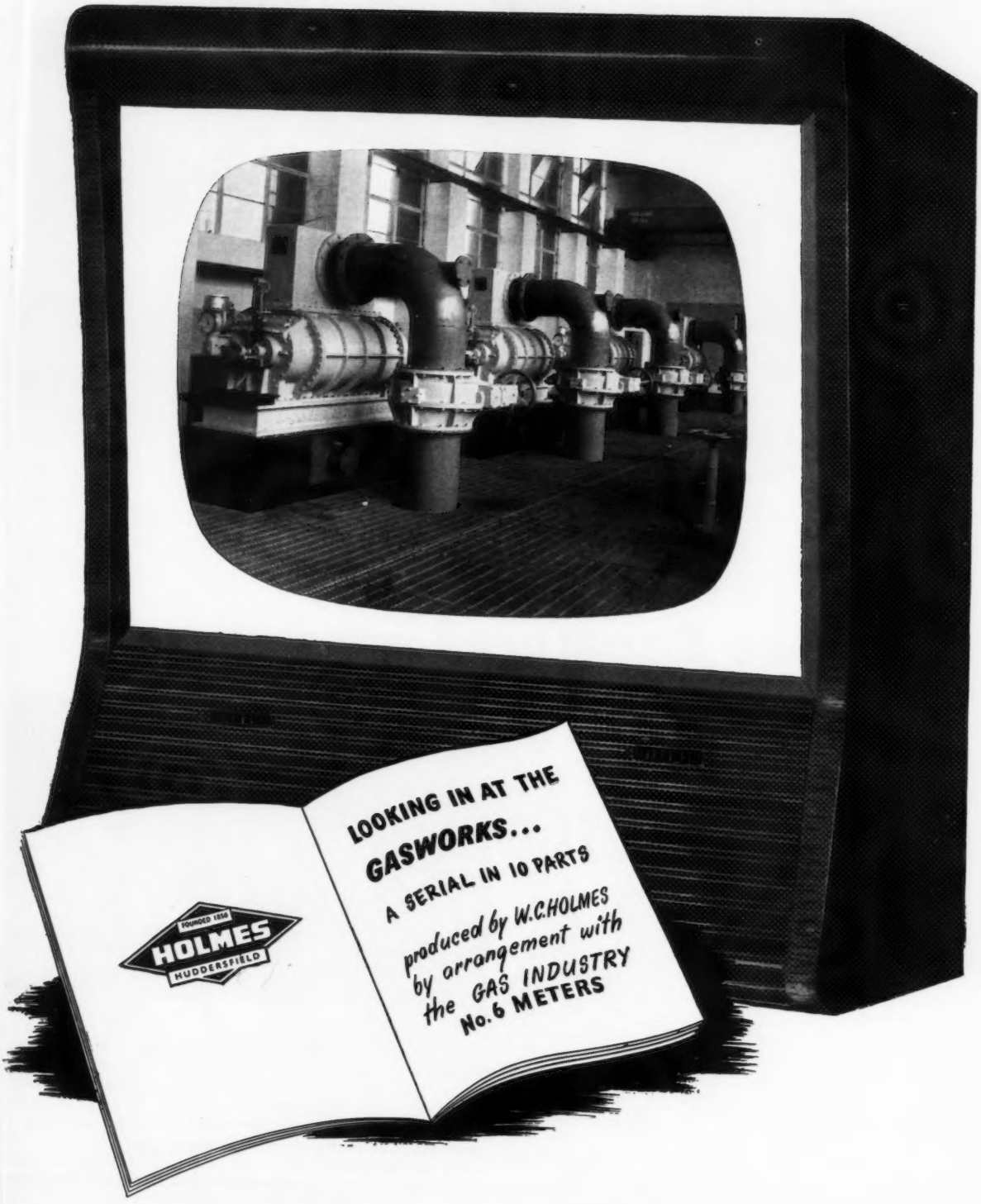
43, Regent Street,
Swindon.

PLANT FOR SALE

FOR SALE: NEW GAS-FIRED BOILER by Hartley & Sugden. 160 lbs./hour at 80 lbs. p.s.i., complete with chimney, spare burner and controls. Original purchase price was £419. Our price £200. W. H. COLLINGBOURNE & CO., LTD., 1481, Stratford Road, Birmingham, 28. Phone: Shirley 3303.

The
LIMIT OF EFFICIENCY CAN BE REACHED
by the use of
LUX
GAS PURIFYING MATERIAL
Sole Importers:
HARRISONS (London) LIMITED
66, Mark Lane, LONDON, E.C.3
Telegrams: Birchrock, London
Telephone: ROYal 3120

Commercial T.V. with no apologies



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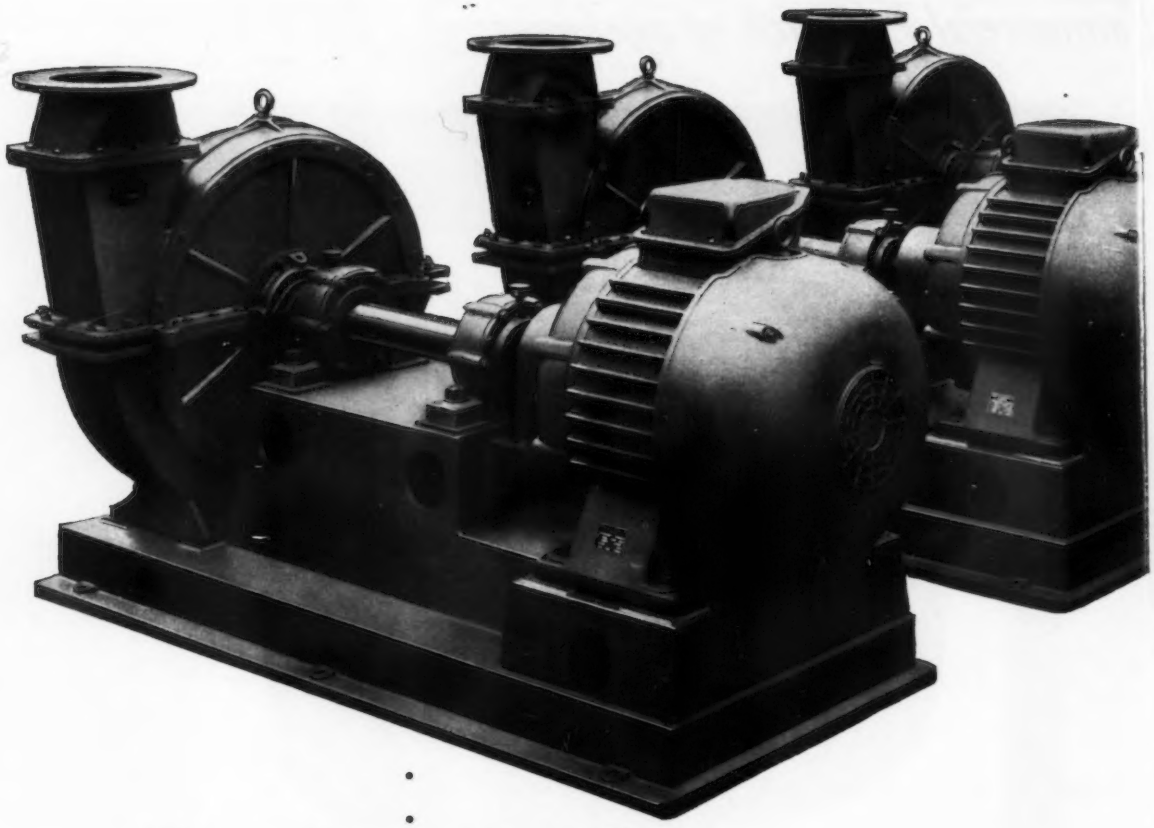
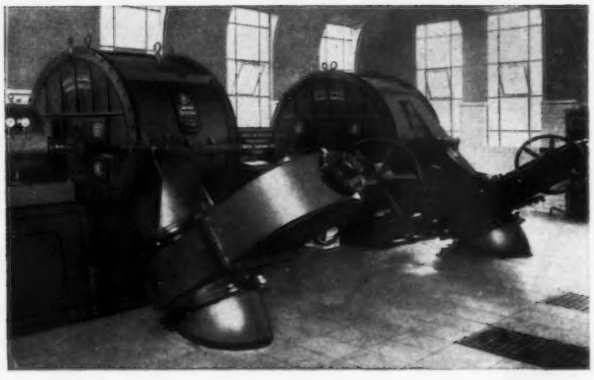


Gas Boosters?



EXAMPLES of gas boosting fans with cast iron casings are illustrated here. They represent the results of special attention to the design and development of robust, trouble-free boosters over the years. This experience provides fans for handling volumes of 5,000 to 1½ million cubic feet of gas per hour at pressures up to several pounds per square inch.
When the time comes you'll find there's no easier way to solve your air or gas moving problem than to put it to Keith Blackman.

contact **Keith Blackman Ltd**
MILL MEAD ROAD · LONDON · N17 · TOTtenham 4522

T.A.7225/61

Registered as a Newspaper. Printed by STRAKER BROTHERS LTD., E.C.2 for WALTER KING LIMITED, 11, BOLT COURT, FLEET ST., LONDON, E.C.4, Wednesday, August 17, 195

GLOVER–WEST

CONTINUOUS VERTICAL RETORTS

C.O.L

INTERMITTENT VERTICAL CHAMBERS

WEST'S GAS IMPROVEMENT CO., LTD

ALBION IRONWORKS • MILES PLATTING • MANCHESTER 10
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AND IN LONDON

Columbia House, Aldwych, W. C.2. Tel: HOLborn 4108 Grams: Wesgasco, Estrand
C.O.L. Division: Chandos House, Buckingham Gate, S.W.1. Tel: ABBey 6912

GC2

"BROOMWADE" IN ACTION

Photograph by courtesy of the Borough Engineer of Brighouse

. . . IN YORKSHIRE

Efficient? — yes

Job completed on time? — yes

That's "Broomwade" Pneumatic Equipment at work

RELIABILITY

The "BROOMWADE" organisation invites consultation on any problems involving the use of compressed air. Service engineers are available in most countries.

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294 SAS